

*E. J. Mord.*




# HOW TO KNOW THE GRASSES

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George M. Gray Museum  
Marine Biological Laboratory  
Woods Hole, Massachusetts 02545

**R. W. POHL**

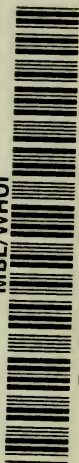
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# How To Know THE GRASSES

George M. Gray Museum  
Marine Biological Laboratory  
Woods Hole, Massachusetts 02543

Pictured-Keys for determining the common and important American grasses with suggestions and aids for their study.

By

RICHARD W. POHL

Associate Professor Botany

Iowa State College



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"Living Things—How to Know Them," Jaques, 1946

"How to Know the Trees," Jaques, 1946

"Plant Families—How to Know Them," Jaques, 1948

"Plants We Eat and Wear," Jaques, 1943

"How to Know the Spring Flowers," Cuthbert, 1943, 1949

"How to Know the Mosses," Conard, 1944

"How to Know the Land Birds," Jaques, 1947

"How to Know the Fall Flowers," Cuthbert, 1948

"How to Know the Immature Insects," Chu, 1949

"How to Know the Protozoa," Jahn, 1949

"How to Know the Mammals," Booth, 1949

"How to Know the Beetles," Jaques, 1951

"How to Know the Spiders," Kaston, 1952

"How to Know the Grasses," Pohl, 1954

In Both Spiral and Cloth Binding

*Other Subjects in Preparation*



## INTRODUCTION



IN the main text of this book, 293 kinds of grasses are illustrated and keyed out. These are the commonest and most important species of American grasses—those that the beginner is most apt to meet, and those of importance in farming, gardening, weed control, range and pasture management. In addition to those keyed and illustrated, 91 others are mentioned in connection with closely related species, and their distinguishing features are pointed out.

The illustrations are all new and have been made from actual specimens. Most of the spikelet drawings were made by camera lucida or projection methods and hence represent individual spikelets, not averages. Drawings of small structures, such as spikelets or their parts, bear measuring scales. These are used to indicate the size of the structures, exactly like the scales used in maps. The scales are marked off into spaces representing millimeters, and the total length of the scale in millimeters is marked. In a few drawings the scale is designed for one particular object, in which case an arrow points to the intended object.

The maps included in the species drawings represent approximate ranges of the species. Due to lack of exact information, particularly about the arctic and tropical extensions of these ranges, the maps cannot be entirely accurate, but will serve to give a general idea of the geographic area in which a species may occur in favorable habitats. The maps are based upon published records, herbarium specimens, and the author's personal information.

Drawings marked with the letter B are the work of Mrs. J. Bardach of Iowa State Teachers College, whose assistance is gratefully acknowledged. All others are the work of the author.

For most species, the period of flowering and fruiting is indicated. These dates cover the entire period during which fully developed and intact inflorescences can be found on the plants. Since grass flowers are rarely used in identification, actual flowering dates are not given.

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Many persons have aided in the production of this little book. First of all, the author wishes to thank his wife and family, for the gift of time, which allowed its completion. The facilities of Iowa State

College, in particular the excellent grass herbarium, were invaluable. Dr. H. E. Jaques, the editor of the Pictured-Key Nature Series, has been constantly helpful. The keys have been tested repeatedly by the author's students, and for their cooperation he extends his heartfelt thanks.

Ames, Iowa  
October, 1953

Richard W. Pohl

The Grass Family ranks near the top of the plant kingdom in the number of species it contains. No other group of plants figures so prominently in furnishing us with food. To know a good number of grasses is a cultural obligation as well as a source of personal satisfaction.

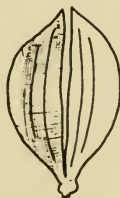
Dr. Pohl's keys and illustrations are the result of years of study and work with these interesting plants. His book is well worthy of a place in the Pictured-Key Nature Series and in the library of every plant lover.

H. E. Jaques

Editor

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LIGHT ON A "GLUMEY" SUBJECT

Lachryma Iob



Simler  
1566 AD

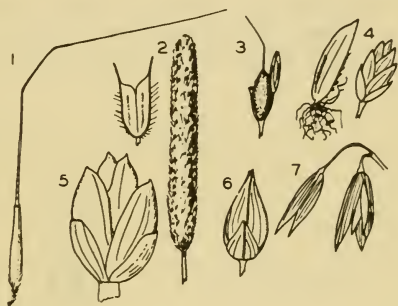
## WHAT IS A GRASS?



F all the world's flowering plants, the grasses are undoubtedly the most important to man. They contribute tremendously to the earth's green mantle of vegetation; they are the source of the principal foods of man and his domestic animals. Without the grasses, agriculture would be virtually impossible: grain, sugar, syrup, spice, paper, perfume, pasture, oil and timber, and a thousand other

items of daily use are products of various grasses. They hold the hills, plains and mountains against the destructive erosive forces of wind and water. In the end, they form the sod that covers the sleeping dead.

Despite the fact that the grasses are so important to us, we usually know little about them. Why? Because we think that "All grasses are alike," or "They are too hard to tell apart." But neither statement is true. There are over five thousand "kinds" or species of grasses in the world and fourteen hundred of these are found in the United States alone. This book contains descriptions and pictures of over three hundred of the more common grasses of our country. While many are superficially similar, they all have good individual marks of recognition. Nobody would at a second glance, for example, confuse foxtail and corn, or quackgrass and oats, or Sudan grass and barley, yet these are all grasses, members of one natural family, the GRAMINEAE, or grass family.



Grasses are easy to recognize. Here are some common ones. 1. Floret of porcupine grass (*Stipa*). 2. Spikelet and panicle of timothy (*Phleum*). 3. Branchlet with spikelets of Johnson grass (*Sorghum*). 4. Floret and spikelet of Kentucky bluegrass (*Poa*). 5. Spikelet of wheat (*Triticum*). 6. Spikelet of proso millet (*Panicum*). 7. Spikelets of oats (*Avena*).

## HOW TO RECOGNIZE THE GRASS FAMILY

The grasses and their allies are all members of the great group of flowering plants which we call the MONOCOTYLEDONS. The members of this group are alike in having one seed leaf, parallel-veined leaves (with few exceptions), and stems in which the vascular bundles are scattered in the pith. Among the Monocotyledons, members of three families of plants have a "grasslike" appearance and may be confused. These are the grasses (Gramineae), the sedges (Cyperaceae), and the rushes (Juncaceae). A little study of the following key and pictures will show how to separate them quickly and surely.



# HOW TO KNOW THE GRASSES

## KEY TO GRASSES, SEDGES AND RUSHES

- 1a. Flowers with stiff, greenish or brownish, six-parted perianth (calyx and corolla); stamens 6 or 3; fruit a many-seeded capsule; leaves usually wiry and round in cross section.....RUSH FAMILY (JUNCACEAE)
- 1b. Flowers without evident calyx or corolla, gathered into short scaly clusters (spikelets); stamens 3; fruit with a single seed.....2
- 2a. Leaves in 2 vertical rows or ranks; leaf sheaths usually split, with overlapping edges; stems usually round in cross section and hollow between the joints; each flower of the spikelet contained between 2 bracts, the lemma and the palea.....GRASS FAMILY (GRAMINEAE)
- 2b. Leaves in 3 vertical rows or ranks; leaf sheaths tubular, not split; stems often triangular in cross section and solid between joints; each flower of the spikelet in the axil of a single bract, the glume.....SEDEG FAMILY (CYPERACEAE)

### DIFFERENCES AMONG GRASSES, SEDGES, AND RUSHES

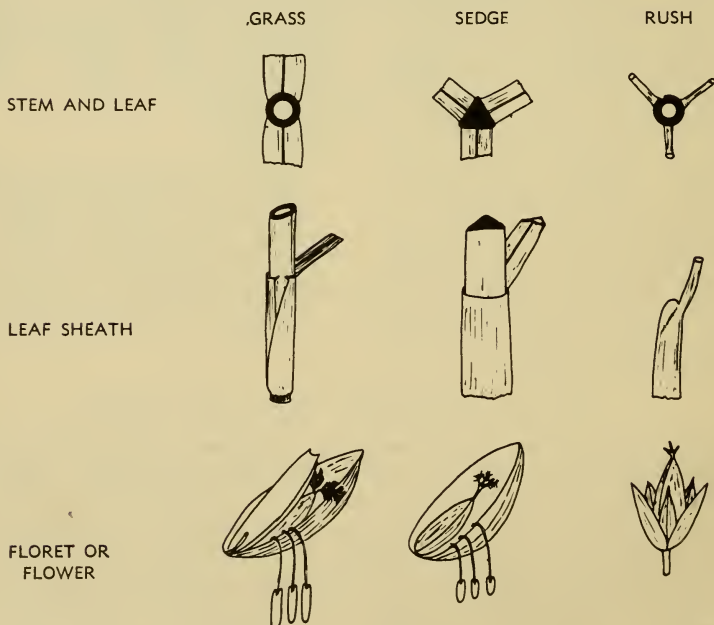


Figure 1

## WHAT DO GRASSES LOOK LIKE?

## ROOTS

The root systems of grasses (Fig. 2) are always fibrous and the majority of the roots arise from the lower nodes of the stems. Because of the fibrous nature of the roots, they are excellent soil binders. When we pull up a grass plant, we remove only a small portion of the total root system, which in many species may reach a depth of six feet or more.

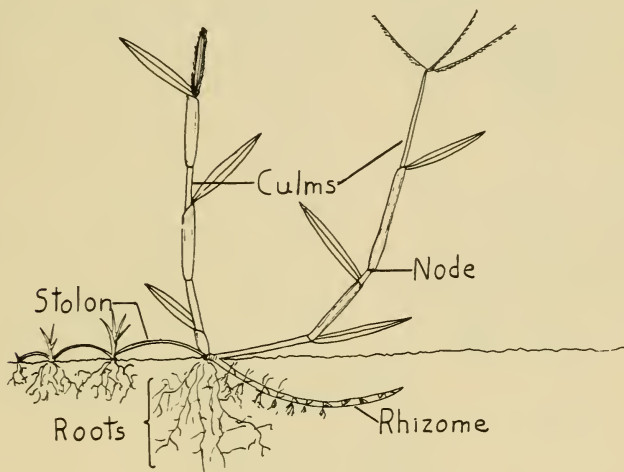


Figure 2

## STEMS

The flowering stems or culms of grasses (Fig. 2) are jointed and usually round and hollow between the solid joints (nodes). They may branch, in which case a thin membrane, H-shaped in cross section, lies between the main culm and the branch. It is called a prophyllum (Fig. 3), and it grasps the main culm with two flanges and the branch with the other two. Thus it serves as a brace to the weak V-joint between the main stem and the branch. Stems may be erect, or with bent, knee-like bases (decumbent), or they may trail on the surface of the ground (stolons) and root at the nodes, or they may even grow in the top few inches of soil (rhizomes). The stems of grasses range in size from those like six-weeks fescue, a millimeter or two in diameter and a few centimeters tall, up to the giant bamboos, which may attain a height of a hundred feet and a diameter of a foot or more.

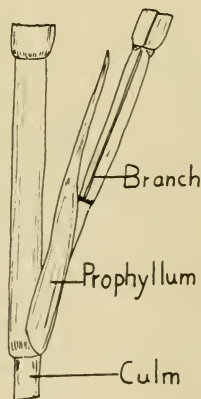


Figure 3

## LEAVES

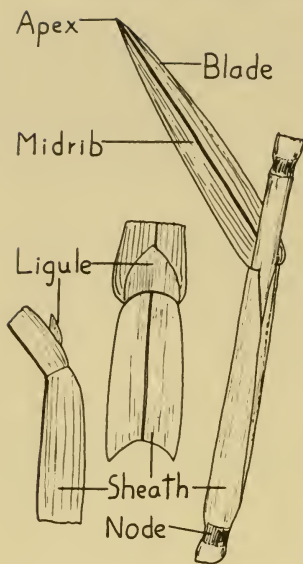


Figure 4

The leaves of grasses are always parallel-veined and generally have long, narrow blades. The foliage leaf of grasses (Fig. 4), consists of a sheath, a ligule, and a blade. There is no petiole. The **sheath** is the split tubular portion surrounding the culm; the **ligule** is a little membrane-like or hairy collar which sticks up at the juncture of sheath and blade; the **blade** is the spreading portion of the leaf. It usually has a conspicuous **midrib** as well as numerous smaller **nerves** or **veins** parallel to the midrib. The tip, or **apex**, of the leaf is sharp pointed. Little projections at the base of the leaf blade are called **auricles**. In a few genera, notably *Bromus*, *Melica*, *Schizachne*, and *Glyceria*, the leaf sheath has joined edges, forming a tube, much the same as in the Cyperaceae.

## FLOWER CLUSTERS

The flower cluster or inflorescence (Fig. 5) of grasses is always made up of a number of subdivisions called spikelets. The spikelets

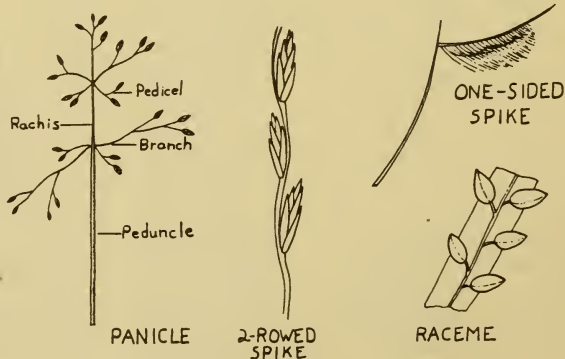


Figure 5

are arranged in **panicles**, or **two-rowed spikes**, or **one-sided spikes**, or **racemes**. The parts of the inflorescence include the stalk or peduncle, the central axis or **rachis**, main and small branches, and the stalks of the individual spikelets or **pedicels**. At the base of each branch there may be found a little swelling, the **pulvinus**, which helps spread the branch of the inflorescence when it emerges from the sheath.

## SPIKELETS

Since the flowers of grasses are minute, simple, and very similar, they are rarely used in classification. Instead, we look for differences in the **bracts** (modified leaves) which surround the flowers. The unit subdivisions of the inflorescence are called **spikelets** (Fig. 6). The

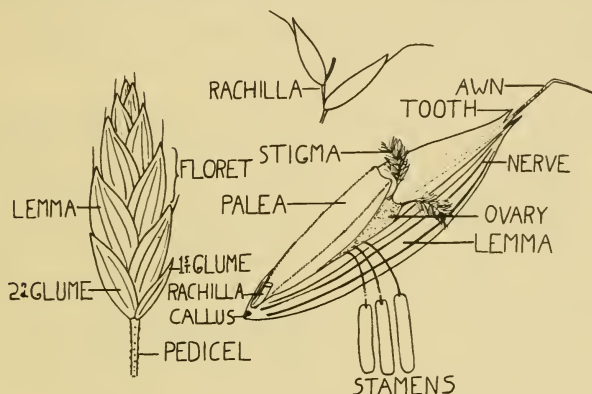


Figure 6

simplest sort of spikelet is merely a tiny scaly branchlet of flowers, each flower being surrounded by two bracts. At the base of this branchlet there are two bracts which have no flowers in their axils. These are the **first and second glumes**. The remainder of the spikelet is made up of flowering units called **florets**, which are arranged alternately in two rows on a central stalk, called a **rachilla**, which is usually concealed by the overlapping florets. Each floret consists of an outer bract or **lemma** and an inner bract or **palea**, with the naked flower between them. The lemma corresponds to an ordinary foliage leaf, the palea to the prophyllum, and the flower to a branch. During the brief time of flowering, two little blisters, the **lodicules**, which lie between the ovary of the flower and the lemma, swell up and force the lemma outwards. This allows the stigmas and stamens to protrude. The lodicules are the evolutionary vestiges of a calyx. If you can find smooth brome grass, orchard grass, or any one of many other grasses in bloom in the morning dew, you can usually observe the lodicules with a hand lens. The actual flower consists of two lodicules, three stamens with long slender filaments, and an ovary with two feathery

stigmas. All grasses are wind pollinated except the few which are self pollinated within closed florets (cleistogamous). The lemma has a midrib and a number of smaller "veins" or "nerves" running roughly parallel to it, but converging toward the tip. The midrib of the lemma may be prolonged into a beard or bristle, called an **awn**. Rarely the lateral nerves also protrude. If the lemma is prominently folded along the midrib, it is said to have a **keel**. The hardened lower end of the lemma is called a **callus**. The palea always has two veins near the sides, but lacks a midrib. In some grasses the palea is small or lacking. Usually the spikelet has a stalk or **pedicel**, or this may be absent, as in wheat and rye, and then the spikelet is said to be **sessile**. Usually spikelets break up at maturity into individual florets, each of which will then bear a segment of the rachilla. Some spikelets, like those of switch grass and foxtail grass, do not break up, but are shed from the plant whole.



Figure 7

Often it is necessary to determine at what points the spikelets break or disarticulate. When the spikelets are mature and dry, they will disarticulate naturally, but if one has a rather immature plant, it may be necessary to tease the spikelets apart with needles and tweezers or with the finger nail in order to tell where the disarticulation will occur. There are two general types of disarticulation: below the glumes (Fig. 7, a), and above the glumes (Fig. 7, b). Spikelets which disarticulate below the glumes leave nothing on the plant except the stubs of the pedicels. Those which disarticulate above the glumes leave them on the plant. Spikelets of this type usually disarticulate between the florets as well.

Another feature of the spikelet which we may need to know is its shape in cross section. Spikelets may be round in cross section (Fig. 8, a), or flattened from the sides of the glumes and lemmas (laterally

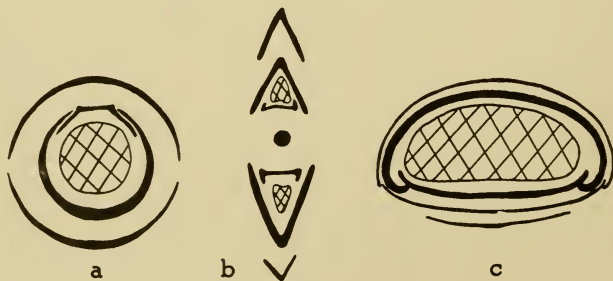


Figure 8



## HOW TO KNOW THE GRASSES

compressed), as in Fig. 8, b; or flattened from the backs of the glumes and lemmas (dorsally compressed), as in Fig. 8, c.

The kind of spikelet pictured in Fig. 6 is probably the basic type, from which reduced or more complicated sorts have been derived by various changes. In studying other types of grass spikelets, we should mentally compare them with the basic type in order to decide which parts have been modified or eliminated. The following types of changes are common, and they characterize large groups of grasses:

1. The glumes may become large, covering the whole spikelets (oats and its relatives).
2. The upper florets may become eliminated, so that the spikelet is one-flowered (red top, timothy, and their relatives).
3. The lower florets may become sterile and much reduced in size, the upper one remaining fertile (canary grass, foxtail).
4. The glumes may become reduced to little ridges on the tip of the pedicel (rice, cut grass).
5. Either stamens or pistil may be eliminated, giving rise to spikelets or plants of one sex (salt grass, creeping love grass, Texas bluegrass, corn, Sorghum, wild rice).

## HOW TO COLLECT AND STUDY GRASSES



PROBABLY there is not a county in the United States where less than fifty to one hundred different species of grasses are to be found. Some will be very common and conspicuous, but others will be rare and hard to find. At first, all may look rather similar, so that sharp observation will be needed to detect even all of the common grasses around us. Don't be afraid to get down on hands and knees and crawl to get a good look. Each sort of habitat will have its own grasses: look in prairie, woodland, marsh, bog, ditches, corn or cotton fields, deserts, mountain meadows, or alpine summits, and you will probably be rewarded with a different set of species each time. Even in the same locality, new species come into flower throughout the spring, summer, and fall.

Grasses are easy to collect and prepare, so one should always take care to make good specimens, which will be a pleasure to study later.

## HOW TO KNOW THE GRASSES

The tools needed for collecting grasses are simple. First of all, you will need some sort of digger, so that you can get the important underground parts of the plants. I use a long, stout screwdriver, but large hunting knives, geologists picks, or entrenching tools are also satisfactory. Whatever tools you use, be sure to get the parts of the plant that lie below the ground level. Frequently an otherwise good specimen becomes very difficult to identify because the collector has neglected these structures.

After digging a specimen from the ground, one should knock the dirt from the roots or wash them clean. If the plant is too bulky to press flat it may be subdivided and some of the extra inflorescences saved to provide spikelets for dissection. Each specimen is placed in a single folded newspaper sheet (12 x 16 inches as folded) for drying.

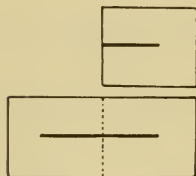


Figure 9

Information which you would like to keep, such as the location, type of habitat, and the date, should be written on the margin of the paper. If the specimen is too long to fit in a folder, it may be doubled back one or more times. Crumpled or tangled parts should be smoothed out. The bent stems can be held in place by little slips of card with a slit cut in each (Fig. 9). The grass specimens in their paper folders may be carried between sheets of beaverboard or

plywood, with a light strap around the bundle, for periods as long as a day, before it is necessary to dry them.

Final drying of the specimens is accomplished by placing them, in their folders, between 12 x 18 inch blotters made of builders' deadening felt (obtainable from lumber yards, in rolls), or between thick pads of newspapers. The specimens must be kept under pressure until dry, either by placing boards on the sides of the bundle and strapping it tightly, or by placing heavy weights on top of the bundle. Each day the damp blotters or newspaper pads must be removed and replaced with dry ones. The damp blotters may be dried by laying them out in the sun on dry paving (not grass) for a short while. In wet weather, the blotters can be cautiously dried in a warm oven. Usually grass specimens dry in a few days. After drying, they may be handled in the paper folders, but they will keep better if they are mounted on paper.

One may mount specimens in large scrapbooks, or better still, on standard herbarium sheets which may be purchased from biological supply houses. Specimens may be glued to paper by placing them momentarily on a large sheet of glass covered with thin glue, brushed to a thin uniform layer. Fish glue, carriage glue, or LaPages Special

## HOW TO KNOW THE GRASSES

A Tin Paste are satisfactory for this purpose. Each specimen, after

gluing, is then dropped onto a sheet of paper. Since grasses are often quite waxy, they do not always stick well and should also be sewed to the sheet with string or fastened down with narrow strips of gummed cloth tape (see Fig. 10). Do not use "Scotch" tape, since it becomes sticky and brittle with age or pulls loose. A label, bearing the name of the plant, the place and date of collection, and any other pertinent information, should be glued in the lower right corner of the sheet. Loose spikelets or other small parts may be placed in small coin envelopes

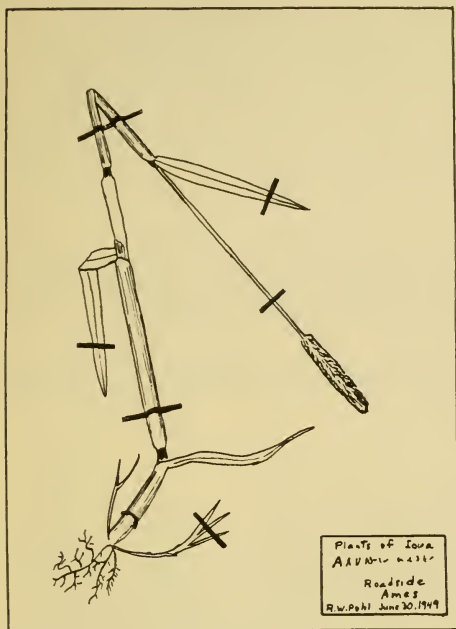


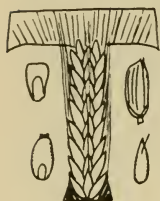
Figure 10

which are glued to the sheet.

When considerable numbers of specimens are needed, for use in classes or for display, they may be preserved by tying them in sheaves and allowing them to hang head down until dry.

The equipment which one needs for studying grasses is simple and inexpensive. A good hand lens, of ten to fifteen power is essential, and should always be carried when collecting. A pair of dissecting needles, well sharpened, are needed. A small scalpel, made by heating and pounding out the tip of a large needle, then retempering and sharpening the edge, is a great help. These can sometimes be purchased through biological supply houses. A pair of good tweezers, preferably with curved tips, a razor blade, and a millimeter scale complete the equipment. When available, a low power binocular microscope will speed and simplify the job of seeing. If such a microscope is not obtainable, one might mount a hand lens on an improvised stand, so as to leave both hands free for dissecting the specimens. To soften dried grass spikelets so that they may be dissected more readily, one may apply a few drops of a strong solution of Dreft or Vel in water.

# HOW TO RECOGNIZE THE TRIBES OF GRASSES



THE common grasses of the United States are grouped into thirteen tribes, or subdivisions of the family. With a little practice, it is usually possible to determine the tribe to which a given grass belongs very quickly, thereby making it unnecessary to go through a portion of the key. The following summaries of the characteristics of the different tribes should help you to recognize them.

**Subfamily FESTUCOIDEAE.** Spikelets with one to numerous florets; sterile florets, if present, usually at the tip of the spikelet; spikelets laterally compressed or round in cross section; disarticulation usually above the glumes.

**Tribe I. BAMBUSEAE.** Tall plants, with woody perennial culms. Spikelets rarely present. Page 15.

**Tribe II. FESTUCEAE.** Spikelets with several to many florets; glumes not reaching the tip of the lowermost floret; disarticulation usually above the glumes; inflorescence a panicle. Fig. 11. Pages 23-84.



Figure 11

**Tribe III. HORDEAE.** Inflorescence a single terminal spike, with spikelets in rows on opposite sides of the rachis. Spikelets with one to several florets, usually disarticulating above the glumes. Fig. 12. Pages 85-94.



Figure 12

**Tribe IV. AVENEAE.** Spikelets similar to those of the Festuceae, but with much enlarged glumes, usually covering the entire spikelet. Disarticulation above or below the glumes; inflorescence a panicle. Fig. 13. Pages 95-101.



Figure 13

## HOW TO KNOW THE GRASSES

Tribe V. AGROSTIDEAE. Spikelets consisting of two glumes and a single fertile floret. There are never any sterile or rudimentary florets. Spikelets disarticulating above or below the glumes. Inflorescence an open or spikelike panicle. Fig. 14. Pages 102-129.



Figure 14

Tribe VI. ZOYSIEAE. Spikelets various, usually with one or two fertile and some rudimentary sterile florets. The spikelets drop from the rachis of the inflorescence in little groups. A small tribe, mostly found in the dry regions of the Southwest. Inflorescence spikelike. Fig. 15. Pages 129, 130.



Figure 15

Tribe VII. CHLORIDEAE. Spikelets with one to several florets, arranged in two rows on the under-side of one to many spikes. Fig. 16. Pages 131-143.



Figure 16

Tribe VIII. PHALARIDEAE. Spikelets with enlarged glumes and one perfect terminal floret, with one or two staminate or sterile florets or little scales below it. The sterile florets fall attached to the perfect one. Disarticulation above the glumes. Fig. 17. Pages 144, 145.



Figure 17

Tribe IX. ORYZEAE. Each spikelet consists of a single fertile floret. The glumes are lacking or reduced to minute ridges at the tip of the pedicel. Fig. 18. Pages 146, 147.



Figure 18



Tribe X. ZIZANIEAE. Aquatic grasses; spikelets consisting of a single staminate or pistillate floret; glumes lacking or reduced to ridges at the tip of the pedicel. Fig. 19. Pages 147, 148.



Figure 19

Subfamily PANICOIDEAE. Spikelets with a single perfect floret and a sterile one below it. The spikelet consists of a first glume (sometimes small or absent), a second glume as long as the whole spikelet, a sterile lemma, and a fertile floret. The spikelets are dorsally compressed and disarticulation is always below the glumes.

Tribe XI. PANICEAE. The glumes and sterile lemma are thinner in texture than the fertile lemma and palea, which are hard or leathery. The first glume is usually much shorter than the second. Spikelets borne in panicles or racemes. Fig. 20. Pages 149-175.

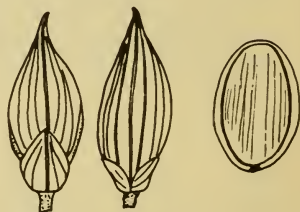


Figure 20

Tribe XII. ANDROPOGONEAE. Spikelets with two equal hardened glumes, which completely inclose the thin, delicate sterile lemma and fertile floret. Spikelets borne in racemes or spikes, a pair of them borne at each joint of the rachis. One spikelet of each pair is perfect and fertile, the other usually staminate, sterile, or rudimentary. Fig. 21. Pages 176-183.



Figure 21

Tribe XIII. TRIPSACEAE. Stout, tall, corn-like plants, usually with solid stems. Spikelets are all unisexual, the staminate ones borne in one or more terminal racemes (sometimes forming a tassel), the pistillate ones borne in bony beads or rachis joints, or on cobs. The only common genera except *Zea* (corn) are *Tripsacum* (gama grass) and Job's Tears (*Coix*). Fig. 22. Pages 184, 185.

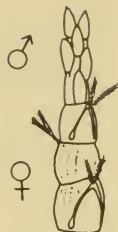


Figure 22

## SOME USEFUL BOOKS ON GRASSES



THE following short list includes some of the principal books useful for identification or study of American grasses. The list is not intended to be complete, and some books which are old or unavailable have been omitted. You will find that a book on the grasses of your own state, or an adjacent one, will often make identification easier than such comprehensive works as Hitchcock's Manual, which covers a large and diverse area.

- Blomquist, H. L. 1948. The grasses of North Carolina. pp. vi plus 276. Keys, descriptions and illustrations. Duke Univ. Press. Durham.
- Beetle, A. A. 1947. Distribution of the native grasses of California. Hilgardia 17: 309-357. Maps of distributions and discussions of ranges of the species; no keys or descriptions.
- Chase, Agnes. 1937. First book of grasses. Revised edition. pp. xiii plus 125. Good, well-illustrated explanations of spikelet structure for the various tribes. W. A. Silveus, San Antonio, Tex.
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# PICTURED-KEYS TO COMMON AMERICAN GRASSES

- 1a. Plants with woody perennial culms, one to many meters tall (bamboos). Fig. 23.

## Tribe I. BAMBUSEAE

### CANE

*Arundinaria gigantea* (Walt.) Chapm.

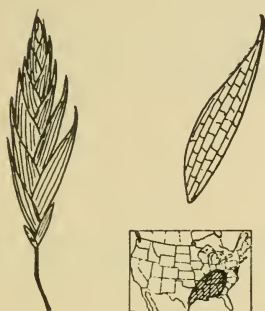


Figure 23

Stems (canes) woody, perennial, reaching as much as 10 m. in height; plants rarely flowering. Cane grows in dense colonies, called canebrakes, in river bottomlands from Virginia to the Ohio Valley and southward to eastern Texas and Florida. The canes are used for fish poles, basketry, and in a variety of other ways. The young shoots and leaves are eagerly taken by domestic animals. A smaller form of cane, with culms usually less than 2 m. tall, is called *Arundinaria tecta* (Walt.) Muhl.

While cane is our only native bamboo, a number of other species are sometimes grown for ornament. Hardest of these is *Pseudosasa japonica*, a small bushy bamboo reaching 2—3 m. tall, spreading by rhizomes and forming dense colonies.

- 1b. Plants with non-woody annual culms, usually less than 2 m. tall .....2
- 2a. Some or all of the spikelets inclosed in bony beads or spiny burs .....3
- 2b. Spikelets not inclosed in beads or burs.....6
- 3a. Pistillate spikelets only inclosed in smooth bony beads.....4
- 3b. Perfect spikelets inclosed in burs covered with hooks or spines .....5

- 4a. Low, creeping perennial plants, rooting at the nodes; staminate and pistillate spikelets on separate plants. Fig. 24.....  
 .....See Fig. 247 (*Buchloe dactyloides*)



Figure 24

- 4b. Erect, coarse grasses; staminate spikelets at the tip of the inflorescence; bony pistillate portion at the base. Fig. 25.....  
 .....TRIBE XIII, TRIPSACEAE, page 184



Figure 25

- 5a. Spines of the burs hooked at the tips.....  
 .....see Fig. 244. (*Tragus berteronianus*)
- 5b. Spines of the burs straight, not hooked.....  
 .....see Fig. 282. (*Cenchrus pauciflorus*)
- 6a. Spikelets falling from the plants in clusters of 2—many, never singly .....19
- 6b. Spikelets either falling singly or breaking up into florets and leaving the glumes behind on the plant.....7
- 7a. Spikelets of two unlike kinds (one staminate and the other pistillate) in the same or different inflorescences.....8
- 7b. Spikelets alike and nearly always with perfect flowers, or sometimes perfect and staminate or rudimentary ones borne together .....12



# HOW TO KNOW THE GRASSES

8a. Plants aquatic; pistillate spikelets never on cobs  
nor inclosed in bony rachis joints; staminate  
spikelets with a single flower; glumes absent  
or reduced to minute ridges. Fig. 26.....  
.....TRIBE X, ZIZANIEAE, page 147

8b. Plants not aquatic.....9

9a. Staminate and pistillate spikelets on the same  
or separate plants; pistillate spikelets not on  
a cob nor imbedded in bony rachis joints...10

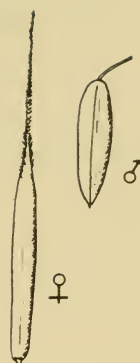


Figure 26

9b. Staminate and pistillate spikelets on the same plant; pistillate  
spikelets on a cob or imbedded in bony joints of the rachis.....  
.....TRIBE XIII, TRIPSACEAE, page 184

10a. Pistillate spikelets with 3-awned lemmas, the staminate awnless;  
plants spreading by stolons, on dry soils.....  
..... see Fig. 46. (*Scleropogon brevifolius*)

10b. Spikelets not awned .....11

11a. Lemmas glabrous, stiff and leathery, with 9—11 faint nerves; plants  
of salty or alkali soil.....see Fig. 45. (*Distichlis stricta*)

11b. Lemmas soft, papery, with 5 nerves, often with a cottony web at-  
tached to the callus.....see Fig. 146. (*Poa arachnifera*)

# HOW TO KNOW THE GRASSES

12a. Spikelets with only one perfect floret, sometimes with unlike staminate, empty, or rudimentary ones above or below it.....13

12b. Spikelets with several perfect or pistillate florets.....27

13a. Entire spikelets breaking from the plant when ripe. Fig. 27 .....14

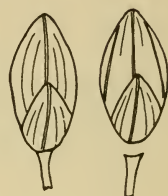


Figure 27

13b. Spikelets when ripe breaking off above the glumes, leaving them on the plant. Fig. 28 .....23



Figure 28

14a. Both glumes absent or reduced to minute ridges below the lemma and palea; spikelets strongly laterally flattened, with strongly keeled lemma and palea. Fig. 29....TRIBE IX, ORYZEAE, page 146



Figure 29

14b. At least one glume well developed; spikelets flat or round in cross section .....15

# HOW TO KNOW THE GRASSES

- 15a. Spikelets laterally compressed or round in cross section (Fig. 30); no sterile florets below the perfect ones.....16

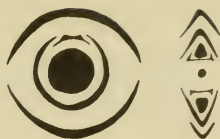


Figure 30

- 15b. Spikelets usually dorsally compressed (Fig. 31), consisting of a perfect floret and an empty lemma or staminate floret and two (rarely one) glumes below it.....18



Figure 31

- 16a. Spikelets sessile or nearly so, borne along the lower sides of one to many spikes.....TRIBE VII, CHLORIDEAE, page 131

- 16b. Spikelets borne on pedicels in panicles, not exclusively on the lower sides of branches.....17

- 17a. Spikelets with a single perfect floret and no sterile or rudimentary ones. Fig. 32.....  
.....TRIBE V, AGROSTIDEAE, page 102



Figure 32

- 17b. Spikelets with two florets, the lower perfect and the upper staminate; both glumes longer than the florets.....see Fig. 190. (*Holcus lanatus*)

- 18a. Glumes and sterile lemma soft and papery; first glume shorter than the spikelet; fertile lemma and palea stiff or leathery. Fig. 33.....  
.....TRIBE XI, PANICEAE, page 149

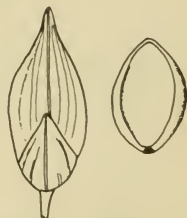


Figure 33

- 18b. Glumes thicker and stiffer than the delicate fertile lemma and palea; both glumes as long as the spikelet; spikelets paired, in racemes; one spikelet of each pair sessile or on a short pedicel, the other on a longer pedicel, sometimes rudimentary. Fig. 34.....  
 ....TRIBE XII, ANDROPOGONEAE, page 176



Figure 34

- 19a. Spikelets borne in two rows along the lower side of the rachis of numerous spikes, which are borne in a raceme along a common rachis; spikes dropping from the rachis whole. Fig. 35.....  
 .....TRIBE VII, CHLORIDEAE, page 131



Figure 35

- 19b. Spikelets not borne in rows along the lower sides of the l—many spikes; spikes remaining whole or breaking up into groups of spikelets or single spikelets..20

- 20a. Rachis breaking up into joints at maturity, each joint bearing 2  
 — 3 spikelets .....22

- 20b. Rachis remaining intact, the groups of spikelets falling from it..21

- 21a. Spikelets falling with a ring of long hairs attached.....  
 .....see Fig. 284. (genus *Pennisetum*)

- 21b. Spikelets without a ring of hairs attached.....  
 .....TRIBE VI, ZOYSIEAE, page 129

# HOW TO KNOW THE GRASSES

22a. Each joint bearing 2 spikelets, usually one sessile and perfect and one pedicellate and staminate or sterile; glumes thick, the fertile lemma very thin and delicate.....  
 .....TRIBE XII, ANDROPOGONEAE, page 176

22b. Each joint bearing 3 spikelets, the lateral two often sterile and reduced in size; lemmas not thin and delicate.....  
 .....TRIBE III, HORDEAE, page 85

23a. Inflorescence a panicle, sometimes dense or contracted; each spikelet on a pedicel.....25

23b. Inflorescence of one or more spikes, the spikelets sessile .....24

24a. Spike single, terminal, with the spikelets borne in rows on opposite sides of the rachis. Fig. 36.....  
 .....TRIBE III, HORDEAE, page 85

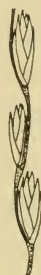


Figure 36

24b. Spikes 1—many, the spikelets arranged in two rows on the lower side of the rachis of each spike. Fig. 35.....  
 .....TRIBE VII, CHLORIDEAE, page 131

25a. Spikelets consisting of two (rarely one) glumes and a single perfect floret, no staminate or rudimentary ones with it. Fig. 37.....  
 .....TRIBE V, AGROSTIDEAE, page 102



Figure 37

25b. Spikelets with a perfect terminal floret and one or two staminate or rudimentary ones, often reduced to little scales, below it....26



# HOW TO KNOW THE GRASSES

- 26a. Spikelets with two similar florets, the lower staminate and with a bent awn, the upper perfect and with a short straight awn .....  
...see Fig. 179. (*Arrhenatherum elatius*)



Figure 38

- 26b. Spikelets with a single perfect floret and 1 or 2 unlike staminate or sterile florets or little scales borne below it.....  
...Fig. 38. TRIBE VIII, PHALARIDEAE, page 144

- 27a. Spikelets borne in one or more spikes, sessile or rarely on short pedicels less than 1 mm. long.....24

- 27b. Spikelets in open or dense panicles, each spikelet on a pedicel. .28

- 28a. Glumes not reaching above the tip of the lowest floret; lemmas awnless or with one or more awns arising at the tip or between teeth. Fig. 39.....TRIBE II, FESTUCEAE, page 23



Figure 39

- 28b. Glumes reaching beyond the tip of the lowest floret and usually beyond the uppermost floret; lemmas awnless or with a single awn arising from the back or between two teeth. Fig. 40...29

- 29a. Sheaths with united edges.....  
.....TRIBE II, FESTUCEAE, page 23

- 29b. Sheaths with overlapping edges.....30

- 30a. Lemmas with 3 prominent, conspicuously hairy nerves, all 3 extending into short awns — see Fig. 52 and following. (genus *Tridens*)

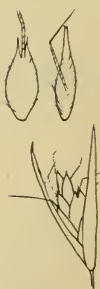


Figure 40

- 30b. Lemmas not as above.....31

- 31a. Tall stout grasses 1 — several m. tall; lemmas or rachilla joints covered with long straight hairs which conceal the spikelets .....  
.....TRIBE II, FESTUCEAE, page 23

- 31b. Grasses of small to moderate stature, seldom over 1 m. tall; lemmas and rachilla joints smooth or hairy, but not concealed by long hairs.....  
.....TRIBE IV, AVENEAE, page 95

TRIBE II. FESTUCEAE

1a. Spikelets all similar in appearance (rarely unisexual).....2

1b. Spikelets of 2 different kinds.....8

2a. Lemmas undivided or with not more than 3 awns at the tips...3

2b. Lemmas bearing at the tip 9 or more awns, which are feathery on the lower half. Fig. 41.

PAPPUS GRASS

*Enneapogon desvauxii* Beauv.

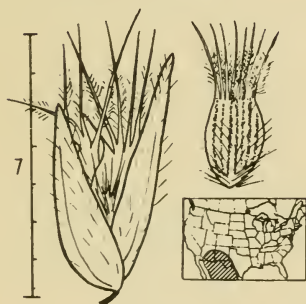


Figure 41

Perennial; tufted; culms 20—40 cm. long; panicles spike-like. Leaf blades threadlike, about 1 mm. wide. The lower sheaths are somewhat swollen, and contain cleistogamous spikelets which have nearly awnless lemmas. Several related species in the genus *Pappophorum* lack the feathery hairs on the awns. Dry desert hills and plains, from western Texas to Arizona and southward. Forage value low. September—October. Also called *Pappophorum wrightii*.

3a. Rachilla joints or backs of the lemmas bearing long straight hairs which give the spikelets a silky appearance; tall grasses, the culms 1—4 m. high .....4

3b. Rachillas and lemmas not covered with hairs which cover the spikelet; (lemmas sometimes hairy on nerves or callus); plants usually 1.5 m. or less tall .....5

4a. Long hairs borne on the rachilla; lemmas smooth. Fig. 42.

REED

*Phragmites communis* Trin.



Figure 42

Reed is a tall perennial grass, reaching 4 m. or more in height, with smooth, polished stems and long and very broad leaves. The plants spread widely by vigorous rhizomes, forming great colonies along the margins of streams and in marshes and ditches. In autumn the large panicles become very feathery because of the hairy rachillas. The lowermost floret of the spikelet is staminate or sterile.

Reed is widespread in the United States and is also known from all of the continents of the world. Fossil rhizomes of reed have been found in Europe, making it one of the few grasses known from past geological ages. July—October.

4b. Rachilla not hairy; lemmas covered with long hairs. Fig. 43.

GIANT REED

*Arundo donax* L.



Figure 43

Perennial. This is one of the most spectacular of grasses of the temperate zone. The great culms reach a height of 6 m., and a thickness of 5 cm. or more. The plumelike panicles which are produced by well established clumps may reach a length of 60 cm. Altogether, the plants resemble bamboos closely, but the stems do not persist over winter. Giant reed is a native of Europe, but is cultivated and naturalized in

our southern states, and has proved hardy in cultivation as far north as central Iowa. The tough rind of the culms is used to make clarinet reeds. Fall.

## HOW TO KNOW THE GRASSES

5a. Staminate and pistillate spikelets similar but on separate plants..6

5b. Spikelets all perfect .....9

6a. Plants annual, spreading extensively by delicate stolons, forming flat mats on muddy ground....23a

6b. Plants perennial, spreading by rhizomes; culms erect, the plants not forming flat mats.....7

7a. Lemmas pubescent or with a cottony web of hairs at the base. Fig. 44.....110b



Figure 44

7b. Lemmas glabrous; plants of salty or alkali soils. Fig. 45.

### SALT GRASS

*Distichlis stricta* (Torr.) Rydb.



Figure 45

Perennial; spreading by stiff, scaly rhizomes; plants 10—40 cm. tall. The salt grasses are coarse, stiff plants of saline or alkali flats in the drier parts of the western states and in the coastal salt marshes. *D. stricta* is confined to the interior of the western United States. In desert areas, it is eaten readily by cattle, but it is seldom taken where more succulent forage is available. April—September.

*Distichlis spicata* (L.) Greene, a very similar species, grows in brackish marshes along our entire Atlantic, Gulf and Pacific Coasts.

- 8a. Spikelets unisexual, the pistillate ones with lemmas each bearing 3 long awns, the staminate ones awnless; stolon-bearing plants of the southwestern states. Fig. 46.

**BURRO GRASS**

*Scleropogon brevifolius* Phil.

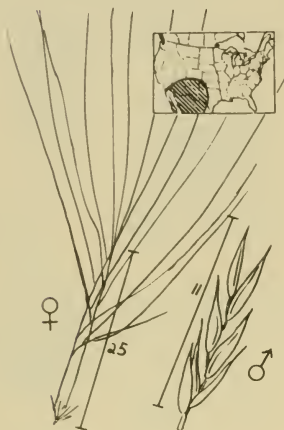


Figure 46

Burro grass is a low perennial, 10—20 cm. tall, spreading by stolons and making patches. Staminate and pistillate inflorescences on the same or different plants. The inflorescences are small tufts of a few erect spikelets. Each pistillate spikelet has a number of florets, which are shed from the glumes as a unit, covered with numerous awns. Each lemma looks much like a floret of *Aristida*, with three long awns. The sharp awns and callus of the pistillate lemmas can penetrate hair, wool, and facial tissues of grazing animals. Burro grass tends to replace more desirable grasses on overgrazed lands of the arid Southwest. Forage value very low. June—September.

- 8b. Spikelets perfect or sterile, the lemmas awnless or with single awns; tufted plants of humid areas; stolons lacking. Fig. 47.

**CRESTED DOGTAIL**

*Cynosurus cristatus* L.



Figure 47

Perennial; tufted, culms 30—60 cm. tall. The sterile spikelets are paired with fertile ones in the same inflorescence. The sterile spikelet is made up of slender empty awned lemmas. Inflorescence a dense, spikelike panicle. Dogtail is a European grass which has been imported for use in lawn and meadow seed mixtures. It is occasionally found in lawns, pastures and waste places in the eastern states and also in the Pacific Northwest. Apparently it has little value for forage. June—August.



## HOW TO KNOW THE GRASSES

- 9a. Lemmas with 3 prominent nerves (the mid-rib and one on each side of it); nerves often hairy. Fig. 48.....10

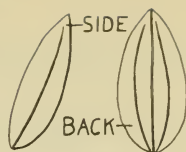


Figure 48

- 9b. Lemmas with 5 or more nerves, which may be inconspicuous. Fig. 49.....42

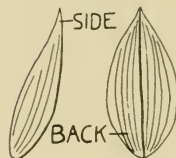


Figure 49

- 10a. Inflorescence small, dense, with few spikelets, partially surrounded by the leaves; small plants of the plains and deserts of the West .....11

- 10b. Inflorescence an open or dense panicle which is supported above the leaves on a peduncle.....12

- 11a. Lemmas long-hairy over the back; spikelets not concealed in leaf sheaths .....15b

- 11b. Lemmas long-hairy only on the margins; spikelets concealed in the upper sheaths; sprawling, mat-forming plants.....  
.....See Fig. 248. (*Munroa squarrosa*)

- 12a. Nerves or callus of the lemmas pubescent.....13

- 12b. Nerves and callus glabrous.....19

- 13a. Nerves of lemmas conspicuously pubescent; plants lacking rhizomes .....14

- 13b. Nerves of lemmas glabrous, the callus with a tuft of long hairs; plants with slender, elongated rhizomes. Fig. 50.

**BLOWOUT GRASS**

*Redfieldia flexuosa* (Thurb.) Vasey



Figure 50

Perennial; culms 60—100 cm. tall; panicles large, pyramidal; leaf blades smooth and tough, elongated, inrolled. The spikelets when mature are fan-shaped, with conspicuous cottony tufts visible from the side. Because of the numerous long, slender rhizomes, blowout grass is able to keep pace with the shifting sands and eventually bind dunes into place. It is an important sand-binding grass on sandy plains from South Dakota to Oklahoma and Arizona. August—October.

- 14a. Palea not fringed with long hairs; plants perennial.....15

- 14b. Palea fringed with long hairs on its upper half; plants annual, with weak, shallow root systems. Fig. 51.

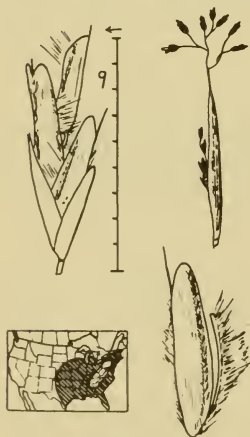


Figure 51

*Triplasis purpurea* (Walt.) Chapm.

Annual; tufted; culms 30—75 cm. long, erect or spreading. In late season, the herbage may become quite reddish. The small terminal inflorescence usually protrudes somewhat from the uppermost sheath, but the axillary panicles are concealed in the swollen sheaths and have cleistogamous spikelets. Common on sandy lands. July—October.

*Triplasis americana* Beauv. is a similar species of the southeastern states. It is perennial and the lemmas have awns about as long as the body.

## HOW TO KNOW THE GRASSES

15a. Spikelets in open or dense panicles which are borne above the leaves; plants without stolons.....16

15b. Spikelets in dense, cottony tufts which are exceeded by clusters of threadlike leaves; plants low, spreading by stolons. Fig. 52.  
**FLUFFGRASS** *Tridens pulchellus* (H. B. K.) Hitch.



Figure 52

Perennial; tufted at first, then spreading by short stolons; usually less than 15 cm. tall. The entire plant consists of a tuft of threadlike basal leaves, from which arise culms which have a single long internode and bear a cluster of spikelets and leaves at the summit. These culms soon bend over and root at the tip. This process may be repeated until a mat of the plant is built up. Fluffgrass is found on thin soils, overgrazed lands, and deserts. Forage value negligible; usually regarded as an indicator of overgrazing. Also known as *Triodia pulchella*. April—October.

16a. Panicles dense, the branches short and close to the rachis, with overlapping spikelets; spikelets not deep purple.....17

16b. Panicles large and open, with spreading branches; spikelets deep reddish purple. Fig. 53.

### PURPLETOP

*Tridens flavus* (L.) Hitch.

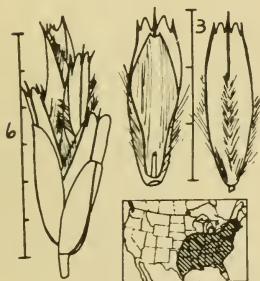


Figure 53

Perennial; tufted; culms 1—1.5 m. tall; panicles graceful and open, up to 35 cm. long; leaf blades smooth, flat, 3—10 mm. wide. The three nerves of the lemma protrude as little points. Open or partially shaded grassy places. Purpletop is eaten by livestock to some extent. It is attractive and colorful and might be grown as an ornamental. Also known as *Triodia flava*. August—October.

*Tridens chapmani* (Small) Chase is somewhat similar. It has a stiffer and more open panicle. A circle of hairs extends completely around the base of each main and secondary panicle branch. Dry woods, mostly on the Coastal Plain, New Jersey to Texas, north to Iowa.

- 17a. Spikelets hairy, variously colored ..... 18  
 17b. Spikelets whitish, glabrous. Fig. 54.

*Tridens albescens* (Vasey) Woot. and Stand.



Figure 54

Perennial; tufted or rarely with rhizomes; culms 30—80 cm. tall; panicles spikelike; leaf blades elongated, 2—4 mm. wide, sometimes inrolled. This species may be confused with species of *Eragrostis*, but the fact that the lemma is split at the tip excludes it from that genus. The plants often grow in draws and around water holes. They are succulent and make good forage, but are seldom found in dense stands. April—October. Also known as *Triodia albescens*.

- 18a. Panicle a dense ovoid tuft, 1—3 cm. long, containing usually less than 10 spikelets. Fig. 55.

*Tridens pilosus* (Buckl.) Hitch.

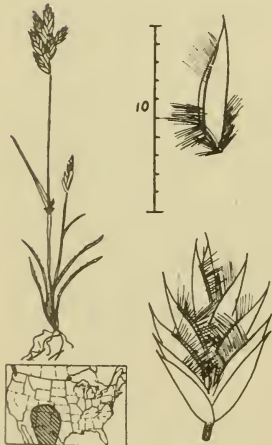


Figure 55

Perennial; tufted; 10—30 cm. tall. Most of the very narrow white-margined leaves are at the base of the plants. The culm usually consists of a single internode. The plants are very shallow rooted and easily pulled up. Found frequently on thin rocky soils and overgrazed ranges of the Southwest. This species has little forage value and is generally regarded as an indicator of overgrazing. March—October. Also known as *Triodia pilosa*.

# HOW TO KNOW THE GRASSES

- 18b. Panicle slender and spikelike, usually 5—15 cm. long, with more than 10 spikelets. Fig. 56.



Figure 56

*Tridens muticus* (Torr.) Nash

Perennial; tufted; culms 30—50 cm. tall. The spikelets often have a faint purplish hue before drying. Leaf blades very narrow, about 1 mm. wide. Overgrazed lands and dry rocky slopes. Forage value low. June—October. Also known as *Tridodia mutica*.

*Tridens elongatus* (Buckl.) Nash is very similar, but has leaf blades up to 3—4 mm. wide; plants 40—80 cm. tall; panicles 10—25 cm. long. Missouri to Texas and Arizona.

- 19a. Lemmas split at the tip. Fig. 57.....17b



Figure 57

- 19b. Lemmas not split at the tip.....20

- 20a. Grain large, bottle-shaped, 5—6 mm. long, forcing the stiff, strongly-keeled lemma and the palea apart at maturity and protruding between them. Fig. 58.



Figure 58

*Diarrhena americana* Beauv.

Perennial; producing numerous scaly rhizomes; culms up to a meter in height; leaves mostly low on the culm, the blades 1—2 cm. wide, scabrous or hairy; panicle slender, with short erect branches, nodding, 10—30 cm. long. Spikelets 10—18 mm. long. Growing in scattered clumps in rich woods. The peculiarly shaped grains are unique among our grasses. July—October.



## HOW TO KNOW THE GRASSES

20b. Grain not bottle-shaped nor forcing the floret open; not over 2 mm. long; lemmas not thick and stiff.....21

21a. Spikelets with three or more florets; lemmas pointed, the veins converging; plants of wet or dry ground. (NOTE: the Genus *Eragrostis*, which follows, is a difficult one. No entirely satisfactory key has ever been made for the species found in the U. S. The following keys are compiled from the best available).....22

21b. Spikelets with two florets; lemmas with wide blunt tips and parallel veins; plants aquatic. Fig. 59.

### BROOKGRASS

*Catabrosa aquatica* (L.) Beauv.

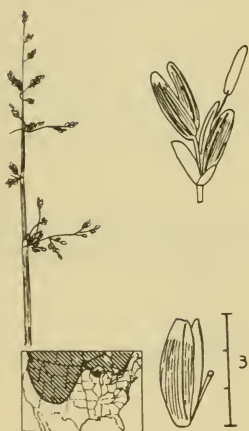


Figure 59

Perennial. The culms may lie on the ground and root at the nodes for half or more of their length of 10—50 cm. Panicles yellowish, 10—20 cm. long, open, pyramidal. Brookgrass is a soft, succulent grass of wet ground, found in the sub-arctic and at higher elevations in the western mountains of the United States. The plants make excellent summer feed for livestock. Found also in northern Europe and Asia. June—August.

22a. Plants forming flat mats, the trailing culms rooting at the nodes..23

22b. Plants erect or with somewhat decumbent culms, but never rooting at the nodes.....24

- 23a. Staminate and pistillate spikelets on separate plants; anthers about 1.5—2 mm. long; panicle dense. Fig. 60.

## *Eragrostis reptans* (Michx.) Nees

Annual; stoloniferous; only a few cm. tall, forming delicate, bright green turf along streams and on wet ground. Spikelets borne in dense panicles, resembling clover heads. Lemmas very strongly keeled. While the two sexes are similar in appearance, they can be told apart by the presence of anthers or stigmas protruding from the florets. Late summer and fall. Forage value low.

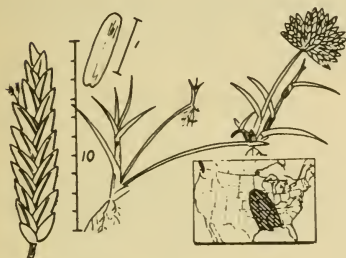


Figure 60

- 23b. Spikelets all with perfect flowers; anthers minute, about 0.2 mm. long. Fig. 61.

## *Eragrostis hypnoides* (Lam.) B. S. P.

Annual; stoloniferous, forming low mats. The panicle is usually open. Lemmas very strongly keeled. The anthers are minute and nearly round, with a bulk of less than  $1/50$  that of those of *E. reptans*. Like most of its relatives, this plant is a warm weather grass, growing rapidly from mid-summer on. Stream banks and wet ground. Forage value low. July—September.

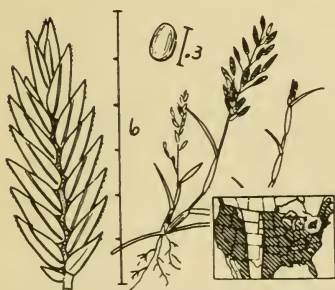


Figure 61

- 24a. Lemmas when mature dropping from the persistent rachilla of the spikelet; (this can be detected by pulling lemmas outward and downward) paleas usually remaining on the rachilla.....36

- 24b. Lemmas not falling separately; spikelets disarticulating between the florets when mature.....25

25a. Paleas without long fringing hairs.....26

25b. Paleas fringed with long straight hairs which nearly cover the spikelets. Fig. 62.

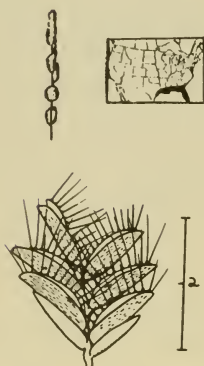


Figure 62

*Eragrostis ciliaris* (L.) R. Br.

This delicate tufted annual grass grows 15—30 cm. tall, and bears dense cylindrical panicles, like those of the foxtail grasses, 3—10 cm. long. The tiny spikelets, only 2—4 mm. long, are immediately identifiable by the long, fringe-like cilia borne on the margins of the palea, which give a sort of spider-web appearance to the spikelets. River banks and open ground. Widespread in warm regions of the world. June—August.

26a. Spikelets 3—15 mm. long.....27

26b. Spikelets 2—3 mm. long; panicle elongated, dense, narrowly cylindrical. Fig. 63.

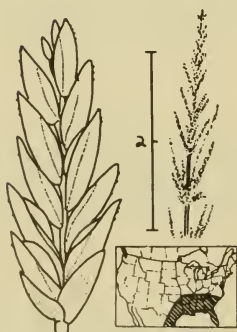


Figure 63

*Eragrostis glomerata* (Walt.) Dewey

Annual; tufted; plants a meter or less in height. *E. glomerata* produces a profusion of slender, cylindrical panicles up to 50 cm. long, with strongly ascending branches. The plants flower from near ground level to the very tip. The tiny spikelets have very thin, translucent lemmas. At maturity the grains are visible through the lemmas. Banks of streams and ditches, alluvial woods. July—November.

- 27a. Spikelets sessile or nearly so, strongly keeled and flattened...28
- 27b. Spikelets on slender pedicels; lemmas keeled or rounded on the back .....29
- 28a. Spikelets few, distant along the few elongated panicle branches, a sessile spikelet and a cottony tuft of hairs in the axil of each panicle branch. Fig. 64.

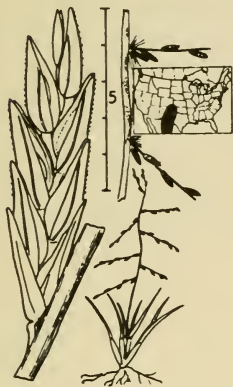


Figure 64

*Eragrostis sessilispica* Buckl.

Perennial; tufted; plants usually 20—40 cm. tall. This is a tumbleweed grass, the panicle breaking off and rolling with the wind when mature. The leaves are clustered in a short basal tuft. The panicle may reach as much as 40 cm. in length. The main axis is somewhat spiral; the branches are straight, stiff, and bear sessile spikelets. Dry sandy plains. Forage value apparently low. May—June.

- 28b. Spikelets numerous, in a dense panicle; no sessile spikelets and cottony tufts in the axils. Fig. 65.

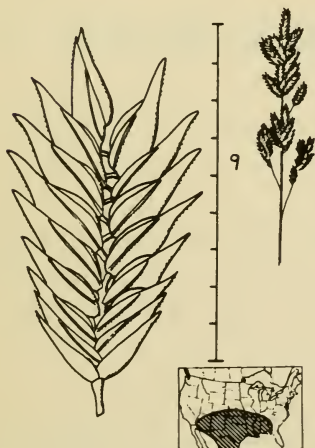


Figure 65

*Eragrostis oxylepis* Torr.

Perennial; wiry; tufted; plants 20—70 cm. tall; leaves 1—5 mm. wide, smooth except at the base of the blade. The spikelets are borne in one or more dense tufts along the axis or branches of the panicle. The spikelets often overlap like shingles. They usually have a reddish or bronzy color when ripe. Sandy or rocky open ground. Forage value apparently low. July—October. Also called *E. secundiflora*.

*Eragrostis beyrichii* J. G. Smith is similar, but the spikelets are pale instead of bronzy. Oklahoma to Mexico.

# HOW TO KNOW THE GRASSES

- 29a. Panicle branches stiffly spreading; spikelets deep reddish purple; lemmas strongly keeled. Fig. 66.

## PURPLE LOVEGRASS

*Eragrostis spectabilis* (Pursh) Steud.

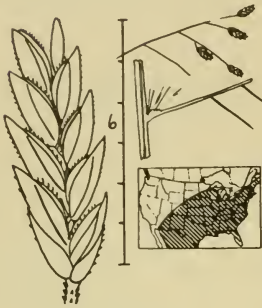


Figure 66

Perennial; tufted; erect or rarely spreading, up to 60 cm. tall. Purple lovegrass has a large, open, dome-shaped panicle which makes up about two-thirds of the height of the plant. The axils of the panicle branches and throats of the sheaths bear conspicuous tufts of white hair. The leaf sheaths may be smooth or hairy. This is one of our most widespread grasses on sandy open ground, and one of the most attractive. July—September.

- 29b. Panicle branches delicate, not stiffly spreading; lemmas not strongly keeled .....30

- 30a Sheaths glabrous, or pubescent on only the upper edges.....31

- 30b. Sheaths pubescent along the edges, on the surface, and on the collar .....32

- 31a. Lemmas 1.8—2.4 mm. long; panicle broad, ovoid.....35



- 31b. Lemmas 2.4—3.4 mm. long; spikelets 4 mm. or more long; panicle elongated, ellipsoid. Fig. 67.

## SAND LOVEGRASS

*Eragrostis trichodes* (Nutt.) Wood

Perennial; tufted; 80—120 cm. tall. The open, cylindrical panicles may make up half the total height of the plant. The spikelets frequently have purplish florets and yellow glumes. Sandy plains and open woodlands. Sand lovegrass has high forage value, but has been virtually destroyed by overgrazing in many of the areas where it once abounded. August—September.

*Eragrostis curvula* (see Fig. 69) sometimes has smooth sheaths and might be keyed out here. It may be recognized by the lead-colored, short-pedicellate spikelets.



Figure 67

- 32a. Sheaths and often blades bearing hairs, each of which arises from a little blister. Fig. 68...33

- 32b. Hairs of sheaths not arising from little blisters .....34

- 33a. Spikelets 5—10 mm. long; lemmas 2.4—3.4 mm. long .....31b

- 33b. Spikelets 2—5 mm. long; lemmas 2.0—2.4 mm. long.....35

- 34a. Panicle not over twice as long as wide; usually 15 cm. wide or wider .....35

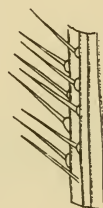


Figure 68

- 34b. Panicle 3 times as long as wide; never over 12 cm. wide; cultivated and sometimes escaping. Fig. 69.

## WEeping LOVEGRASS

*Eragrostis curvula* (Schrad.) Nees



Figure 69

Perennial; tufted; 60—120 cm. tall, forming large round clumps. The leaves are long, drawn out to very fine drooping tips. The panicles are elongated and somewhat drooping; branches not bearing spikelets near the bases; spikelets dull straw colored or leaden gray. Native to South Africa, weeping lovegrass was first brought to the United States as an ornamental, but is now widely planted in the southern states as a forage grass for revegetating abandoned or eroded crop land. It makes excellent pasturage and can be used for hay. The seeds are about 1 mm. long, smooth, amber colored except for the blackish germ. Summer.

*Eragrostis trichodes* (Fig. 67) sometimes has hairy sheaths and may key out here. It may be recognized by the long-pedicellate, usually bronzy or yellowish spikelets.

- 35a. Lemmas 2.0—2.4 mm. long; larger leaf blades 5—10 mm. wide. Fig. 70.

*Eragrostis hirsuta* (Michx.) Nees

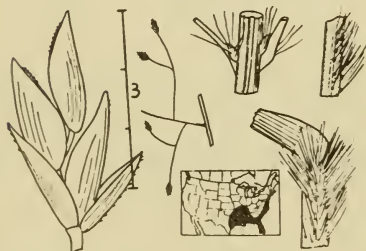


Figure 70

Perennial; tufted; plants becoming a meter or more tall; panicles large, open, cylindrical, half the height of the plant. The leaves are wider than in most other species of this genus and taper to long fine points. The summits of the leaf sheaths (see figure) vary from extremely hairy to glabrous. Dry soil, in open woods and fields. Summer.

- 35b. Lemmas 1.8—2.2 mm. long; larger leaf blades 2—3 mm. wide.  
Fig. 71.

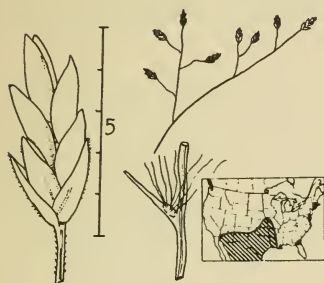


Figure 71

## *Eragrostis intermedia* Hitch.

Perennial; tufted; reaching nearly a meter in height. This species has an open, dome-shaped panicle with slender delicate branchlets. The leaf blades are narrow, involute, and drawn out to slender tips; sheaths glabrous or the lower ones somewhat hairy. Dry sandy open ground. June—September.

- 36a. Plants perennial, usually 50—150 cm. tall, forming large clumps from hard, knotty bases; basal buds of next years growth present at flowering time.....go back to.....27

- 36b. Plants annual, usually less than 50 cm. tall, from soft, shallow-rooted bases; no basal buds present at flowering time.....37

- 37a. Spikelets with 2—4 (rarely 5) florets.....38

- 37b. Spikelets with 6—many florets (rarely 5 in starved plants)....39

- 38a. Pedicels of lateral spikelets 3—many times as long as the spikelets; panicle large, diffuse, 2/3 or more of the total height of the plant; plants erect. Fig. 72.

## LACEGRASS

*Eragrostis capillaris* (L.) Nees

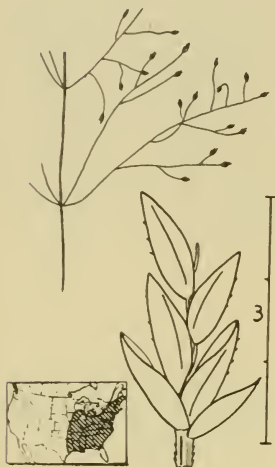


Figure 72

Lacegrass is a densely tufted annual, up to 50 cm. in height. Culms much branched at the base, the plants bearing numerous panicles; leaf sheaths somewhat hairy, especially at the throat; blades flat, hairy on the upper surface, 1—3 mm. wide; panicles open-cylindrical or elliptical, making up most of the height of the plants. Spikelets 2—3 mm. long, with 2—4 florets; glumes about 1 mm. long; lemmas about 1.5 mm. long. The minute grains are about 0.5 mm. long. Lacegrass is a common weed of open, dry situations on waste ground, in fields, and thin woods. August—September.

- 38b. Pedicels of lateral spikelets short, rarely more than twice the length of the spikelets; panicles about half the length of the sprawling plants. Fig. 73.

*Eragrostis frankii* C. A. Mey.



Figure 73

Annual. A weed of river banks and wet alluvial bottoms, *E. frankii* makes sprawling bushy tufts. The culms are seldom more than 25 cm. long. Leaf sheaths and blades usually smooth except at the throat. The ellipsoidal panicle is much denser than that of *E. capillaris*, because of the shorter pedicels. August—September.

- 39a. Plants without glands on spikelets or branches; spikelets 2 mm. or less wide .....40

- 39b. Plants bearing minute blister-like glands on the keels of the glumes and lemmas and the branches of the panicle; spikelets 2.5—3.5 mm. wide when mature. Fig. 74.

## STINKGRASS

*Eragrostis cilianensis* (All.) Link



Figure 74

Annual; tufted; culms erect or somewhat spreading; panicles ovoid or pyramidal, rather dense. The keels of the glumes and lemmas bear tiny circular glands. Stinkgrass is a vigorous weedy annual, with a strong, musty odor when fresh. It may be poisonous to horses if eaten in large quantities. Frequent in fields, gardens, and dry, disturbed soil. Introduced from Europe and now very common throughout the United States. June—October. Also known as *E. megastachya*.

A very similar species, *E. poaeoides* Beauv., has spikelets with glands on the keels of the lemmas also. The spikelets range from 1.3—2.0 mm. wide. It is less common than stinkgrass. Introduced from Europe.

- 40a. Sheaths bearing a few long hairs on the margins at their summits; paleas remaining on the rachilla.....41



- 40b. Upper sheaths (and usually the lower ones as well) lacking long hairs at their summits; panicle rather dense, the lower branches usually single, bearing 11—40 spikelets; paleas falling from the rachilla with the lemmas. Fig. 75.

*Eragrostis multicaulis* Steud.

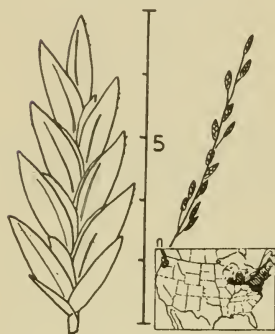


Figure 75

Weedy, tufted, annual, usually under 30 cm. tall. Spikelets 3—4 mm. long, usually with 4—8 florets. After the paleas fall, the minute zig-zag rachillas remain as the only evidence of the spikelets. This species grows mostly as a weed in cities in the northeastern states. Although introduced in the Americas, its homeland is not known with certainty. July—October. Also known as *E. peregina*.

- 41a. Spikelets mostly lying closely appressed to the panicle branches. Fig. 76.

*Eragrostis pectinacea* (Michx.) Nees



Figure 76

Weedy annual; tufted; culms usually 20—30 cm. tall; plants branching freely from the base, forming dense, erect tufts. Spikelets 5—8 mm. long. The manner in which the spikelets lie parallel to the panicle branches is characteristic. Frequent on dry roadsides, waste ground, and cultivated fields; one of the commonest weedy annual grasses. July—October.

- 41b. Spikelets when mature diverging strongly from the panicle branches; spikelets 0.7—1.4 mm. wide; lateral nerves of lemmas obscure. Fig. 77.

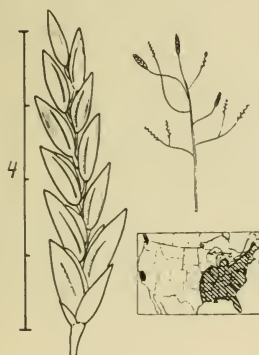


Figure 77

*Eragrostis pilosa* (L.) Beauv.

Annual; tufted; delicate; culms 10—50 cm. tall; panicles open, ellipsoidal. The tiny spikelets, 3—5 mm. long, stand out away from the main panicle branches on hair-like pedicels. Leaf blades 1—3 mm. wide, flat. Introduced from Europe. July—September.

- 42a. Spikelets very strongly laterally compressed, the lemmas keeled .....43  
 42b. Spikelets not strongly compressed, the lemmas rounded on the back .....47  
 43a. Spikelets with 1—5 empty lemmas below the fertile ones; panicles drooping; spikelets large, 2—4 cm. long.....44  
 43b. Spikelets without empty lemmas below the fertile ones; spikelets small or large .....45  
 44a. Spikelets with 4—5 empty lemmas; leaf blades thick and involute, less than 1 cm. wide. Fig. 78.

## SEA OATS

*Uniola paniculata* L.

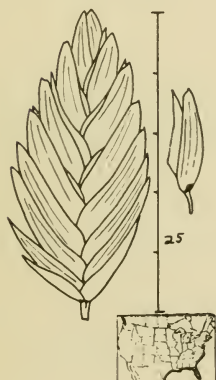


Figure 78

Perennial, producing strong rhizomes; plants up to 1 m. tall; panicles dense, nodding, 20—40 cm. long. The very flat spikelets of the Uniolas are strikingly ornamental. Sea oats inhabits the coastal sand dunes along the Atlantic and Gulf of Mexico and the West Indies. The panicles are frequently harvested and used for winter bouquets and display-window ornaments. Spikelets may be found on the plants at most seasons of the year.

- 44b. Spikelets with 1 empty lemma; leaf blades thin and flat, mostly 1—2 cm. wide. Fig. 79.



Figure 79

*Uniola latifolia* Michx.

Perennial; producing rhizomes; plants 1—1.4 m. tall; panicles open and drooping, 10—20 cm. long. While similar to sea oats, this is a woodland species of rich soil in the southeastern United States. It is highly ornamental and suitable for growing in shaded borders or wild gardens. Several other species of this genus with smaller spikelets also occur in the southeastern states. June—October.

- 45a. Spikelets 2—4 cm. long, in open panicles; lemmas awned or awn-tipped between 2 teeth or below the apex.....77
- 45b. Spikelets usually 1 cm. or less long; lemmas awnless or tapering into a short awn-tip .....46
- 46a. Spikelets on pedicels, in open or contracted panicles; lemmas awnless; glumes not ciliate .....104
- 46b. Spikelets nearly sessile, in dense, one-sided tufts at the ends of the few, long, stiff, panicle branches; glumes and lemmas ciliate on the keels; lemmas pointed or short-awned. Fig. 80.

## ORCHARD GRASS

*Dactylis glomerata* L.



Figure 80

Perennial; tufted; plants 60—120 cm. tall; herbage light green; leaf blades 2—8 mm. wide. The panicle branches spread only at flowering time. The plants grow in large tussocks. They furnish both pasture and hay, and this species is rather important as a forage grass. It will tolerate partial shade. Introduced from Europe. May—July.

# HOW TO KNOW THE GRASSES

47a. Lemmas longer than wide, their margins curled or folded in over the edges of the palea; florets making acute angles with the rachilla .....48

47b. Lemmas nearly circular in outline, their margins not curled in; florets and glumes spreading at right angles to the rachilla. Fig. 81.

## QUAKING GRASS

*Briza minor* L.

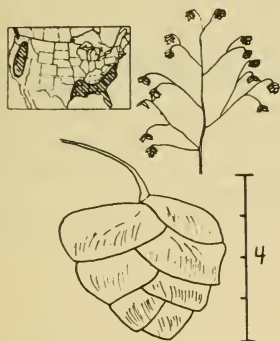


Figure 81

Annual; tufted; 10—40 cm. tall. The species of *Briza* have very slender pedicels, which allow the drooping spikelets to quiver in any slight breeze. Ligules 4—5 mm. long. This species and the next are occasionally grown for ornament and winter bouquets. April—May. Introduced from Europe.

*Briza media* L. is similar, but has larger spikelets. The ligules are about 1.5 mm. long. New England to Michigan. Introduced from Europe.

48a. Callus of the florets covered with prominent straight or cottony hairs .....49

48b. Callus of the florets glabrous.....51

49a. Callus hairy with straight spreading or erect hairs; lemmas awned or awnless. Fig. 82....50



Figure 82

49b. Callus hairy with fine, crimped cottony hairs; lemmas awnless. Fig. 83.....104



Figure 83

## HOW TO KNOW THE GRASSES

50a. Lemmas irregularly toothed and cut at the apex; plants of wet ground or water. Fig. 84.

*Scholochloa festucacea* (Willd.) Link

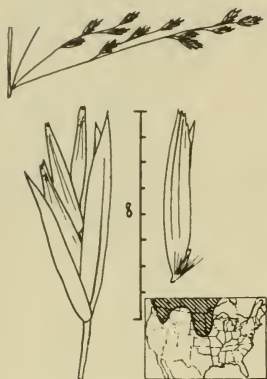


Figure 84

Perennial; spreading by thick, elongated rhizomes; plants 1—1.5 m. tall; panicles open, 15—20 cm. long; leaf blades usually 5—10 mm. wide. This species is a plant of marshes and stream borders, where it often forms large colonies along with sedges, rushes, and other kinds of aquatic grasses. Late June and early July. Furnishes some forage and marsh hay. Also known as *Fluminea festucacea*.

50b. Lemmas awned between 2 teeth; plants of rocky woods. Fig. 85.

*Schizachne purpurascens* (Torr.) Swallen



Figure 85

Perennial; tufted; 50—100 cm. tall; sheaths with united edges; leaf blades narrowed at the base, 1—5 mm. wide; panicles about 10 cm. long, drooping. The glumes of the spikelets are usually purple. This is a rather delicate grass of rocky woodlands. It grows in scattered clumps and is seldom numerous. May—July. Also found in Japan and Siberia.

51a. Upper florets of the spikelets sterile, often wrapped around each other and forming a club- or bell-shaped structure; (CARE!) sheaths with united edges; disarticulation above or below the glumes. .52



## HOW TO KNOW THE GRASSES

- 51b. Upper florets fertile, the lemmas not enwrapping each other; sheaths with overlapping or united edges; spikelets disarticulating above the glumes.....61
- 52a. Spikelets disarticulating below the glumes and falling entire at maturity .....53
- 52b. Spikelets disarticulating above the glumes and between the florets .....56
- 53a. Rudimentary lemmas forming a pointed, cigar-shaped structure .....54
- 53b. Rudimentary lemmas forming a blunt, club-shaped or bell-shaped structure .....55
- 54a. Glumes reaching nearly to the tip of the spikelet; spikelets V-shaped. Fig. 86.

### *Melica stricta* Bolander

Perennial; tufted; plants 15—60 cm. tall; panicle slender, almost unbranched, raceme-like. All of the species of *Melica* have thin, translucent glumes and firmer lemmas. In this species, the glumes frequently have considerable purple coloration. Leaf blades scabrous, hairy on the top, 1—3 mm. wide. Rocky and gravelly slopes in the mountains. Late May—August.

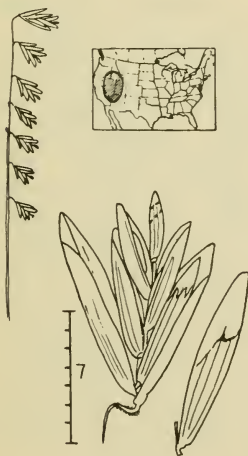


Figure 86

- 54b. Glumes less than  $\frac{2}{3}$  as long as the entire spikelet; spikelets narrow, cylindrical. Fig. 87.

*Melica porteri* Scribn.

Perennial; tufted; 50—100 cm. tall; inflorescences slender and raceme-like, 15—20 cm. long, the branches ascending; spikelets mostly drooping to one side; pedicels hairy; sheaths smooth or scabrous, with united edges; leaf blades 2—5 mm. wide; spikelets green or brownish, not purple, 10—15 mm. long, with 4—5 florets; lemmas strongly-nerved, minutely scabrous. Open woods and slopes, moist ground; 2000—3000 m. elevation. Midsummer—October.

Var. *laxa* Boyle has spreading panicle branches 4—9 cm. long; glumes sometimes purple. Western Texas (Chisos Mts.) to Arizona.



Figure 87

- 55a. Rudiment placed obliquely at the end of the rachilla; tips of fertile florets at the same height. Fig. 88.

*Melica mutica* Walt.

Perennial; tufted; plants 60—100 cm. tall; panicles 10—20 cm. long, with a few simple spreading branches bearing drooping spikelets. Sheaths hairy or scabrous; leaf blades 2—5 mm. wide. Spikelets fan-shaped, 7—10 mm. long, usually with 2 fertile florets and a bell-shaped rudiment, tilted sideways, at the end of the rachilla. This species, while seldom occurring in large stands, is the most widespread of the eastern *Melica* species. It grows in scattered stands in rocky woods. April—June. The name *Melica* refers to honey, but we do not know why Linnaeus applied it to this genus.

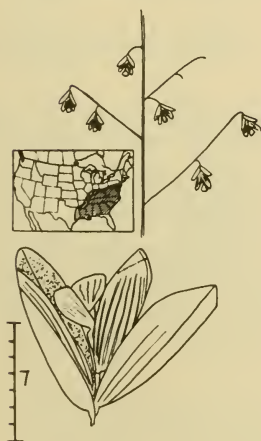


Figure 88

- 55b. Rudiment placed straight on the end of the rachilla; tips of lower florets below that of the uppermost one. Fig. 89.

*Melica nitens* (Scribn.) Hitch.

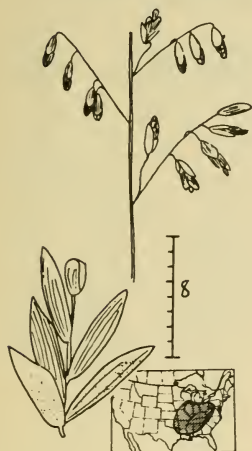


Figure 89

Perennial; tufted; plants 50—120 cm. tall; leaf sheaths glabrous or scabrous; leaf blades 7—15 mm. wide; panicles 10—20 cm. long, with a few branches. The drooping spikelets are more slender than in the previous species and usually have 3 fertile florets. The rudiment is more slender and pointed than in *Melica mutica*. This species is probably more common than the previous one. The two are frequently confused but the position and shape of the rudiment should distinguish them. Scattered in rocky woods. Late April—June.

- 56a. Lemmas without awns.....57

- 56b. Lemmas bearing awns. Fig. 90.

*Melica smithii* (Porter) Vasey

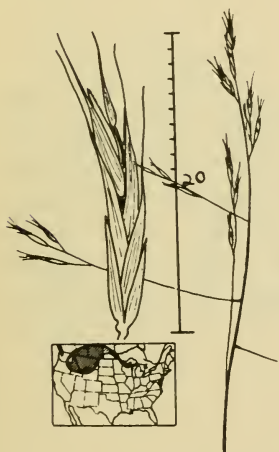


Figure 90

Slender tufted perennial; plants 60—120 cm. tall; sheaths downwardly scabrous; leaf blades soft, scabrous, 6—12 mm. wide. The panicles are very open, 12—25 cm. long, with slender spreading branches bearing spikelets at the tips. The spikelets are 18—20 mm. long, with 3—6 florets, and sometimes are purplish; awns are 3—5 mm. long. This slender woodland grass is found in moist forests. The occurrence in northern Michigan is the result of the cold post-glacial climate which once embraced that area. The plants resemble those of some of the perennial species of *Bromus*, from which they differ in the presence of the rudiment. July—August.

- 57a. Culms with bulbs at the bases.....58
- 57b. Culms without bulbs at the bases.....60
- 58a. Lemmas acute or obtuse, glabrous.....59
- 58b. Lemmas tapering to an acuminate tip, pubescent. Fig. 91.



Figure 91

## *Melica subulata* (Griseb.) Scribn.

Perennial; tufted; plants 60—125 cm. tall; panicles narrow, 10—15 cm. long. The culms of this species and several following have small, onion-like bulbs, about 1 cm. long, at their bases, because of which they are sometimes called onion grasses. Leaf blades usually 2—5 mm. wide. Moist forests. May—July.

- 59a. First glume less than half as long as the spikelet; bulb attached to the crown of the plant by a thin stalk as much as 1 cm. long. Fig. 92.

## ONIONGRASS

## *Melica spectabilis* Scribn.

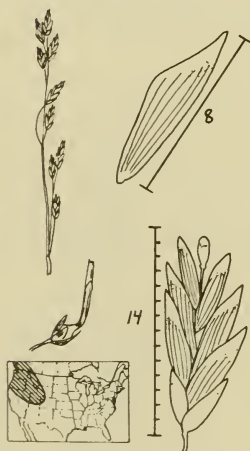


Figure 92

Perennial; plants 30—100 cm. tall; panicle slender, 10—15 cm. long. This is a handsome species with somewhat inflated spikelets, the lemmas purple-tipped. Leaf sheaths hairy; blades flat or rolled, 2—4 mm. wide. Gravelly mountain meadows and slopes. July—August. Forage value good.

59b. First glume more than half as long as the spikelet; bulbs attached directly to a thick knotty crown. Fig. 93.

## ONIONGRASS

*Melica bulbosa* Geyer

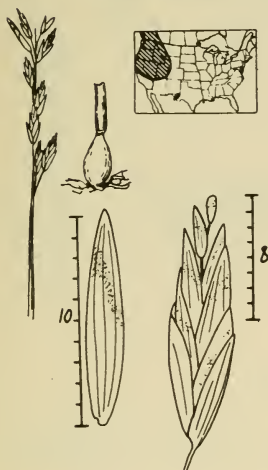


Figure 93

Perennial; plants 30—60 cm. tall; panicle narrow and stiff. Leaf sheaths and blades smooth or hairy; blades 2—4 mm. wide. This is perhaps the commonest western species in the genus. As the name implies, the plants usually have prominent bulbs at the bases of the culms. Woods and open slopes. July—August. Forage value good.

*Melica fugax* Boland. differs from the above species in having soft, thickish rachilla joints which turn tan and wrinkle when dried. The rachilla of *M. bulbosa* is thin, smooth, and white. Panicles 8—15 cm. long, with short spreading or drooping branches. Dry ground, Washington to northern California and Nevada. Good forage for livestock and wild grazing animals. May—June.

60a. Spikelets with 3 or more fertile florets. . . . go back to 59b.

60b. Spikelets with 1 or 2 fertile florets. Fig. 94.

*Melica imperfecta* Trin.

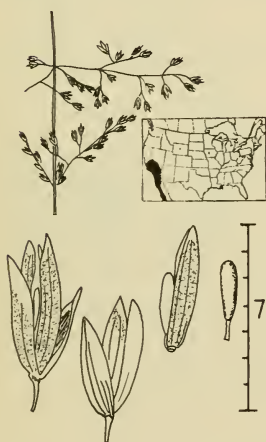


Figure 94

Perennial; tufted or with decumbent culms; plants 25—80 cm. tall, bearing spreading panicles, 5—30 cm. long, of numerous small, often purplish spikelets. In addition to the 1 or 2 fertile florets, there is a slender, yellowish rudiment which is 3—4 times as long as the very short rachilla joint which bears it. Gravelly soil. Good to excellent forage. April—May.



- 61a. Nerves of lemmas running parallel to the tip, not meeting at the tip; lemmas usually rather broad; awnless. Fig. 95 .....62



Figure 95

- 61b. Nerves of lemmas converging at the acute apex; lemmas awnless or awned. Fig. 96.....75



Figure 96

- 62a. Leaf sheaths with united edges.....63
- 62b. Leaf sheaths with free, overlapping edges.....71
- 63a. Spikelets linear, usually 1 cm. or more long, round in cross section, on short pedicels in narrow, erect panicles.....64
- 63b. Spikelets ovate or oblong, flattened, 7 mm. or less long; panicles with drooping or erect branches.....66
- 64a. Lemmas obtuse; palea scarcely longer than the lemma.....65
- 64b. Lemmas acute, the palea much longer than the lemma. Fig. 97.



Figure 97

## *Glyceria acutiflora* Torr.

Perennial; rhizome-bearing; plants 50—100 cm. tall; panicles slender, 15—36 cm. long. Wet soil, swamps, or shallow water. May—August. The species of *Glyceria* all live in wet places, frequently in very shallow water. Their spikelets are very fragile and break up at a touch when ripe. The plants are succulent and make good forage.

- 65a. Lemmas 2.5—4 mm. long, glabrous between the scabrous nerves.  
Fig. 98.

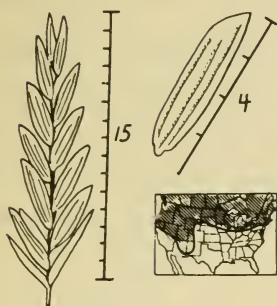


Figure 98

*Glyceria borealis* (Nash) Batch.

Perennial; culms erect or decumbent; plants 60—100 cm. tall; panicles slender, erect, 20—40 cm. long; leaf blades 2—6 mm. wide; spikelets with 6—12 florets, 1—1.5 cm. long. The inflorescence of this species is similar to that of the next (Fig. 99). Shallow water and marshy shores. June—September. This and the next species are very similar. The seeds of their close relatives in Europe are harvested from the water surface for human food.

- 65b. Lemmas 4—5.5 mm. long, minutely scabrous between the nerves.  
Fig. 99.

*Glyceria septentrionalis* Hitch.



Figure 99

Perennial; culms spongy, 1—1.5 m. tall, erect; panicles 20—40 cm. long, with ascending branches; leaf blades 10—20 cm. long, 4—8 mm. wide; foliage smooth or the leaf blades minutely scabrous; spikelets 1—2 cm. long, cylindrical, with 6—12 florets; lemmas about 4 mm. long. This is a tall, succulent grass of shallow water and wet places, probably yielding good forage. May—July.

*Glyceria fluitans* (L.) R. Br. resembles the above but has lemmas 5—6 mm. long, usually purple below the tip. Newfoundland to New York; South Dakota; Eurasia. In eastern Europe, the florets and grains of this species are harvested from the water surface for human food, being made into soup and gruel.

- 66a. Panicle narrow, erect, the branches strongly ascending.....67

- 66b. Panicle open, the branches drooping or spreading.....68

## HOW TO KNOW THE GRASSES

- 67a. Lemmas about 3.5 mm. long; panicle dense, oblong, about 15 cm. or less long. Fig. 100.

### *Glyceria obtusa* (Muhl.) Trin.



Figure 100

Perennial; culms erect or decumbent, 50—100 cm. tall; leaf blades flat or folded; 2—6 mm. wide; spikelets with 4—7 florets, 4—7 mm. long. *Glyceria obtusa* is a characteristic grass of the bogs of the Atlantic Coastal Plain, and found nowhere else. August—September.

- 67b. Lemmas 2.0—2.7 mm. long; panicle slender, 15—36 cm. long. Fig. 101.

### *Glyceria melicaria* (Michx.) F. T. Hubb.

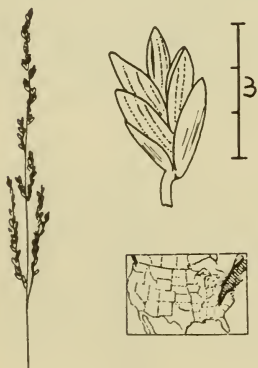


Figure 101

Perennial; culms in small tufts, 60—100 cm. tall; leaf blades long and narrow, rough, 2—5 mm. wide; spikelets with 3—4 florets, about 4 mm. long. The slender, arching culms of this species fringe woodland streams and puddles. July—August.

- 68a. Spikelets oblong or ovate, mostly less than 2 mm. wide; lemmas thin, with conspicuous nerves.....69

- 68b. Spikelets broadly ovate, 2—5 mm. wide, with firm lemmas, the nerves not conspicuous. Fig. 102.



Figure 102

*Glyceria canadensis* (Michx.) Trin.

Perennial; tufted; plants 60—150 cm. tall; panicles 12—20 cm. long. *Glyceria canadensis* is one of the handsomest of grasses. The plump spikelets have a faint resemblance to snake rattles, hence the common name of "rattlesnake manna." Bogs, swamps, along streamlets. July—August.

- 69a. First glume 1 mm. or less long.....70

- 69b. First glume 1.4 mm. or more long. Fig. 103.



Figure 103

*Glyceria grandis* S. Wats.

Perennial; tufted; culms thick and tall, 1—1.5 m. high; leaf blades 6—12 mm. wide; spikelets 4—7 mm. long, with 4—7 florets; panicles 20—40 cm. long. This is a tall species, with large, dense, panicles. It is one of the commonest species of the genus within its range. Marshes and stream banks. June—August.

- 70a. Leaf blades 2—7 mm. wide, firm; culms usually 1 m. or less tall. Fig. 104.

*Glyceria striata* (Lam.) Hitch.



Figure 104

Perennial; forming large clumps; plants 30—100 cm. tall; foliage glabrous; leaf blades flat or folded; panicles drooping, pyramidal, 10—20 cm. long; spikelets 3—4 mm. long, usually with 3—7 florets, often purplish. The spikelets shatter very readily when ripe. This is the most common and widespread of the American species of *Glyceria*. Usually one will find a colony of it around every pond, runnel, or ditch, and it may also grow in moist woods. The plants provide good forage for domestic livestock and elk, especially in later summer when the growth sites are drier. Sea level to 3300 m. elevation. May—August.

- 70b. Leaf blades 6—12 mm. wide, soft; culms usually 1—3 m. tall. Fig. 105.

*Glyceria elata* (Nash) Hitch.

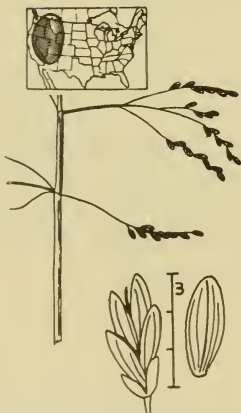


Figure 105

Perennial; tufted; dark green; tall and stout, with spongy culms; panicles oblong, 15—30 cm. long, with spreading or drooping branches; foliage glabrous; leaf blades soft and thin; spikelets 4—6 mm. long, with 6—8 florets. This species looks like a larger version of the previous one, but it is restricted to the western states, where it is the most common and valuable forage species of the genus. Wet meadows, ponds, and moist woodlands. Eaten by all domestic livestock and elk; grazed primarily in late season when the herbage is less succulent and the habitats where it grows are less boggy. June—July.



71a. Nerves of lemmas conspicuous; plants of wet, non-salty soils. .72

71b. Nerves of lemmas inconspicuous; plants of salty or alkali soils. .73

72a. Lemmas 5-nerved; plants found west of the 100th meridian. Fig. 106.



Figure 106

## *Glyceria pauciflora* Presl

Perennial; tufted; leaf blades usually 10—15 cm. long; 5—15 mm. wide; plants 50—120 cm. tall; panicles drooping, 10—20 cm. long; spikelets 4—5 mm. long, usually with 5—6 florets. This and the next species depart from the usual in *Glyceria* by having split sheaths. The broad lemmas have a purple line near their translucent apex. Marshes, wet meadows, and shallow water, up to timber line. June—September.

72b. Lemmas 7-nerved; plants found east of the Mississippi. Fig. 107.

## *Glyceria pallida* (Torr.) Trin.

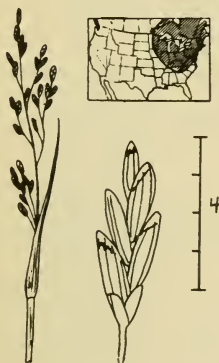


Figure 107

Perennial; plants weak and sprawling; culms 30—100 cm. long; foliage glabrous; leaf sheaths split; blades usually 4—8 mm. wide; panicles open, 5—15 cm. long; spikelets usually 6—7 mm. long, with 4—7 florets; tips of lemmas thin, membranous, irregular; lemmas 2.5—3 mm. long. This species is found in cold, wet places, often in shallow water. May—June.

Var. *fernaldii* Hitch. is a late-blooming form with very narrow leaf blades, 1—3 mm. wide. Wet places and shallow water; Newfoundland to Pennsylvania, westward to Minnesota and Wisconsin.

73a. Panicle pyramidal, open, the lower branches naked near their bases; plants widespread in the U. S. ....74

- 73b. Panicle dense, short, the branches bearing spikelets to their bases; plants of the Atlantic Coast. Fig. 108.

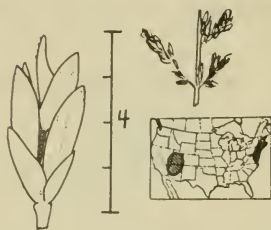


Figure 108

*Puccinellia fasciculata* (Torr.) Bickn.

Perennial; tufted; plants 20—50 cm. tall; panicles 5—15 cm. long, stiff. Leaf blades flat, folded, or rolled, 2—4 mm. wide. The species of *Puccinellia* grow on salty or alkaline wet soil. The lemmas frequently have handsome purplish, bronzy, or golden bands below the apex. This species occurs in salt marshes along the Atlantic Coast. June—?

- 74a. Lower panicle branches bent downward; lemmas blunt, broadest near the apex. Fig. 109.

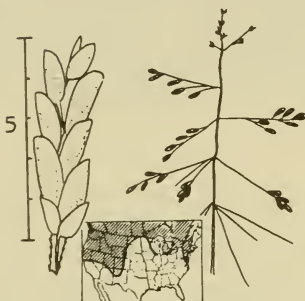


Figure 109

*Puccinellia distans* (L.) Parl.

Perennial; tufted; culms erect or decumbent, 20—50 cm. tall; panicle 5—15 cm. long. The stiffish, drooping lower panicle branches are characteristic. Leaf blades flat or rolled, usually 2—4 mm. wide. Moist soil. Introduced from Europe but now widespread in the United States. June—August.

- 74b. Lower panicle branches not bent down; lemmas acute, broadest near the middle. Fig. 110.

ALKALI GRASS *Puccinellia airoides* (Nutt.) Wats. and Coult.



Figure 110

Perennial; tufted; plants 30—60 cm. tall; panicles 10—20 cm. long. Leaf blades flat or rolled, 1—3 mm. wide. Similar to the preceding species, but with narrower lemmas. Native and widely distributed in the West. Sometimes cultivated under the name of Zawadke Alkali Grass. June—August. Also called *P. nuttalliana*.

## HOW TO KNOW THE GRASSES

- 75a. Lemma bearing an awn between two teeth, or from a point below the tip, or awnless but with a split tip. Fig. 111..76



Figure 111

- 75b. Lemma awnless or bearing an awn at the very tip; tip of lemma never split .....94

- 76a. Spikelets strongly laterally flattened, 2—4 cm. long; lemmas V-shaped in cross section.....77

- 76b. Spikelets not strongly flattened, round in cross section before flowering; lemmas rounded on the back.....78

- 77a. Lemmas awnless or with a short awn less than 2 mm. long. Fig. 112.

### RESCUE GRASS

*Bromus catharticus* Vahl

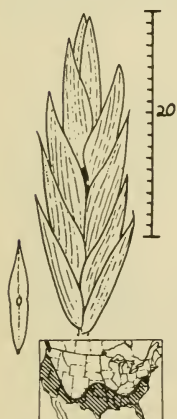


Figure 112

Annual; tufted; culms up to 100 cm. long, erect or spreading; leaf sheaths and blades glabrous or hairy, dark green; panicles open, up to 20 cm. long; spikelets 2—3 cm. long, with 6—12 florets; lemmas glabrous or rarely hairy, about 1.5 cm. long, much flattened and closely overlapping. Rescue grass got its name from its winter annual habit, which makes it one of the earliest forage grasses in the South. It is planted in the fall for winter and spring pasture, but in many areas it has escaped from cultivation and is regarded as a wild plant. With good moisture, it makes lush, highly palatable forage. Heavy, rich soil, bottomlands. Native to South America. March—June.

77b. Lemmas bearing awns 5—15 mm. long. Fig. 113.

**MOUNTAIN BROME**

*Bromus carinatus* H. & A.

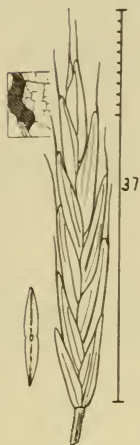


Figure 113

Annual or biennial; tufted; plants 50—100 cm. tall or taller, vigorous and leafy; panicles 15—30 cm. long, with spreading or drooping branches; sheaths and leaf blades smooth or hairy; blades ranging from narrow and involute to broad and flat. A number of closely related and intergrading plants, sometimes recognized as separate species, are included here. These plants are common on open ground and in thin woods in the western states and furnish a good deal of range forage. The foliage and the seed heads are eaten, the latter furnishing a good fattening ration for lambs. The seed of these plants is now available in commerce and the plants are used for range revegetation in the West. March—June.

78a. Lemmas broad, rounded or tapered to the apex, the lateral teeth at the base of the awn not long and sharp.....79

78b. Lemmas narrow, with a hard, sharp callus and long, sharp lateral teeth at the base of the awn.....91

79a. First glume 1-nerved, narrowly lanceolate.....80

79b. First glume 3—5-nerved, ovate or elliptical.....84

80a. Plants tufted, without rhizomes; panicles mostly drooping; lemmas bearing well developed awns.....81

- 80b. Plants bearing rhizomes; panicles erect, with ascending branches; lemmas awnless or with very short awns, 1—2 mm. long. Fig. 114.  
**SMOOTH BROME** *Bromus inermis* Leyss.



Figure 114

Perennial; 50—100 cm. tall; panicles 10—20 cm. long. Smooth brome, introduced from Eurasia, is one of our most successful forage grasses, and has been very widely planted in the U. S. for pasture and hay production. It frequently escapes to roadsides, ditches, and moist wooded areas. June—August.

*Bromus pumpellianus* Scribn. is a closely related species, native to the western states from the Black Hills to Colorado and Alaska. It has rhizomes but the lemmas are hairy. It hybridizes with *B. inermis*.

- 81a. Lemmas pubescent along the margins and lower part of the back, the central portion glabrous. Fig. 115..82

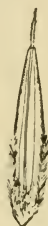


Figure 115

- 81b. Lemmas pubescent across the back.....83

- 82a. Ligule 3—5 mm. long; awns 5 mm. or more long; plants of the western states. Fig. 116.

*Bromus vulgaris* (Hook.) Shear

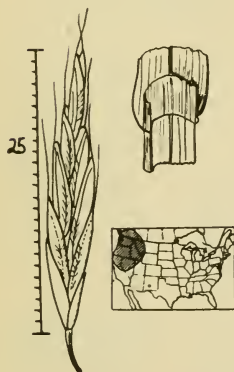


Figure 116

Perennial; tufted; plants slender; culms 80—120 cm. tall; ligules prominent; leaf blades up to 12 mm. wide; panicles drooping, 10—15 cm. long; spikelets about 2.5 cm. long; lemmas usually 8—10 mm. long, hairy on the margins, glabrous or nearly so on the back; awns 5—8 mm. long. Moist rocky woods and canyons. July—August. Forms with nearly glabrous foliage and lemmas are known.



- 82b. Ligule about 1 mm. long; awn 3—5 mm. long; plants widespread.  
Fig. 117.



Figure 117

*Bromus ciliatus* L.

Perennial; tufted; plants 70—120 cm. tall; panicles 15—25 cm. long, drooping. Leaf sheaths glabrous or somewhat hairy; blades smooth or hairy, up to 1 cm. wide. This species has handsome fringed spikelets. It is one of the most widespread of the native woodland bromes in moist rocky or alluvial woods. It provides excellent forage in the western states. July—August.

- 83a. Culms with 3—7 nodes; sheaths without auricles. Fig. 118.



Figure 118

*Bromus purgans* L.

Perennial; tufted, in small clumps; culms erect or leaning; plants usually 60—150 cm. tall; panicles open, drooping, usually 15—20 cm. long; leaf sheaths shorter than the internodes, hairy or rarely glabrous; leaf blades 5—17 mm. wide; lemmas rather uniformly hairy across the back. This is the commonest woodland brome in the eastern United States. It is to be found in nearly every moist woods. June—July.

Forma *glabriflorus* Wiegand is a form of this species which has glabrous lemmas. It may be distinguished from other similar woodland bromes by the anthers, which are 3—4.5 mm. long.

- 83b. Culms with 10—20 nodes, the sheaths longer than the internodes, bearing pointed appendages (auricles) at the throat. Fig. 119.



Figure 119

*Bromus latiglumis* (Shear) Hitch.

Perennial; tufted; culms up to 2 m. tall; panicles usually 15—25 cm. long, rather dense. Leaf sheaths longer than the internodes, hence overlapping. This species blooms several weeks later than *B. purgans*. These two species frequently grow together. The sheaths are often covered with dense grayish wool. Alluvial bottomlands; prairies. July—September.

- 84a. Panicle open, pyramid-shaped, erect or drooping.....85  
 84b. Panicle dense, ovoid, erect, with short branches and overlapping spikelets .....90  
 85a. Lemmas glabrous or scabrous.....86  
 85b. Lemmas heavily pubescent .....89  
 86a. Lemmas bearing awns, not broad or inflated.....87  
 86b. Lemmas awnless or with minute awn tips, very broad and inflated. Fig. 120.

**RATTLESNAKE CHESS**

*Bromus brizaeformis* F. & M.

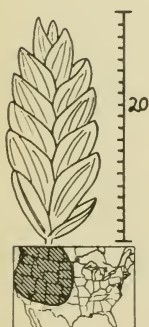


Figure 120

Annual; tufted; plants 30—60 cm. tall; panicles drooping, 5—15 cm. long. The odd, inflated spikelets of this species look much like the rattlers of a rattlesnake. It is sometimes planted for ornament and is occasionally found naturalized in fields and waste ground in the western states and elsewhere. Introduced from Europe. June—August.

- 87a. Lemmas overlapping; rachilla not exposed; awns well developed; upper sheaths pubescent .....88
- 87b. Margins of lemmas rolling inward at maturity, exposing the rachilla; awns short, kinked; upper sheaths glabrous. Fig. 121.  
**CHESS, CHEAT** *Bromus secalinus* L.



Figure 121

Annual; tufted; plants 30—60 cm. tall; panicles 7—12 cm. long. Chess is a common weed of roadsides and grainfields. Maturing quickly, the seeds may be harvested with wheat or other small grains and replanted elsewhere. Introduced from Europe. May—July. Old superstition claimed that cheat came from degenerate small grains, hence the name.

- 88a. Mature spikelets 3—5 mm. wide; lower sheaths densely woolly with tangled or matted soft hairs. Fig. 122.  
**JAPANESE BROME** *Bromus japonicus* Thunb.

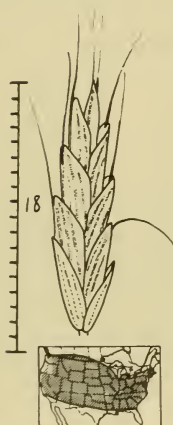


Figure 122

Annual; tufted; plants 40—70 cm. tall; panicles drooping, with delicate flexuous branches. The awns may be straight or bent, depending upon their moisture content. Japanese brome was introduced from the Old World, and is now a very widespread weed of roadsides, fields, and waste ground. May—August.

*Bromus arvensis* L., similar to this species, is very rare in this country, but is often confused with Japanese brome. *B. arvensis* has anthers 3—4 mm. long, those of *B. japonicus* being under 2 mm. long.

## HOW TO KNOW THE GRASSES

88b. Mature spikelets 5—8 mm. wide; lower sheaths covered with straight spreading stiff hairs. Fig. 123.

### *Bromus commutatus* Schrad.

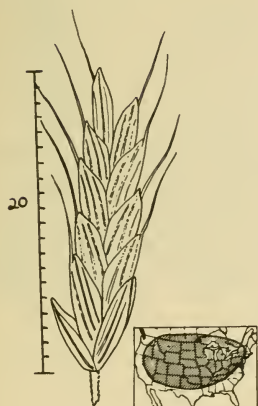


Figure 123

Annual; tufted; plants usually 30—100 cm. tall, freely branching from the base; foliage hairy; panicles open, pyramidal, usually 5—15 cm. long. In plants growing on sterile dry soil, the inflorescence may be reduced to a raceme of a few spikelets. Such plants closely resemble *B. racemosus* (Fig. 127). This species is closely related to *B. secalinus*, from which it differs in the greater hairiness of the foliage and more overlapping florets. Along with *B. japonicus* and *B. secalinus*, this species is a widespread weed of fields and waste places. It is particularly common in the eastern and far western states, but apparently somewhat rare in the Middle West. Introduced from Europe. June—July.

89a. Leaf blades 2—4 mm. wide, sparsely hairy; from North Dakota to western Texas and westward. Fig. 124.

### *Bromus anomalus* Rupr.

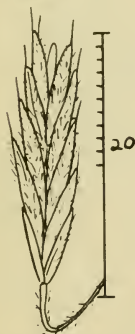


Figure 124

Perennial; tufted; culms slender, 30—60 cm. tall; nodes hairy; sheaths somewhat hairy or glabrous; panicles small, drooping, usually 10 cm. long or shorter; spikelets few, drooping, densely hairy; first glume with 3 nerves, the second with 5; lemmas about 12 mm. long, the awns 2—4 mm. long. *Bromus anomalus* is widespread and common in the Rocky Mountain region, where it is regarded as a very valuable forage grass for all kinds of domestic livestock and for wild grazing animals. It grows in aspen, spruce, and pine forests and on open ground in meadows and parks, at elevations up to 3000 m. July—September.

*Var. lanitipes* (Shear) Hitch. has woolly sheaths.

89b. Leaf blades 5—10 mm. wide, densely hairy; Minnesota and Iowa eastward. Fig. 125.

**WILD CHESS**

*Bromus kalmii* A. Gray

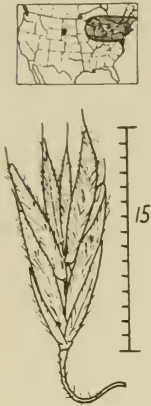


Figure 125

Perennial; tufted; plants 50—100 cm. tall; panicles small, 5—10 cm. long, drooping. The lemmas are very conspicuously hairy. This and the preceding species are the only native perennial woodland species with 3-nerved first glumes. Roadsides and open woods. July—August.

90a. Lemmas hairy. Fig. 126.

*Bromus mollis* L.



Figure 126

Annual; tufted; plants 20—80 cm. tall; leaf sheaths and blades softly hairy; panicles stiff, dense, and erect, 5—10 cm. long; glumes and lemmas hairy; first glume with 3 or 5 nerves, the second with 5 or 7; lemmas soft, with 7 nerves, usually 7—9 mm. long. This weedy species was introduced from Europe. It is found occasionally in the eastern and middlewestern states, but has become very abundant in the Pacific Coast states. It provides short-season spring forage, but because of its shallow roots and annual habit, does not effectively protect the soil from erosion and is regarded as much inferior to the perennial grasses which it replaces in overgrazed areas. April—June. *Bromus mollis* hybridizes with the next species.



90b. Lemmas glabrous. Fig. 127.

*Bromus racemosus* L.



Figure 127

Annual; tufted; 20—80 cm. tall; panicle stiff, dense, erect. *Bromus racemosus* closely resembles the preceding species and hybridizes with it. It is much less common in the eastern states, however. Starved plants of *B. commutatus* resemble *B. racemosus* but have more open panicles. This is a weedy annual of open ground, introduced from Europe. Low value, short-season spring forage. Spring.

91a. Panicle open, the branches spreading or drooping.....92

91b. Panicle dense, erect. Fig. 128.

*Bromus rubens* L.



Figure 128

Annual; tufted; plants 15—40 cm. tall; panicles 4—8 cm. long. The little reddish bushy panicles look like ragged bristle brushes. Common in the Intermountain Region and Pacific Coast States, on open dry ground. The awns may injure livestock by piercing the facial tissues. Poor, scanty feed. March—June. Introduced from the Mediterranean area.

92a. Second glume at least 12 mm. long; lemmas glabrous or sparsely stiff-hairy; awns 2—5 cm. long.....93

- 92b. Second glume 10 mm. long or shorter; lemmas usually softly pubescent; awns 1—2 cm. long. Fig. 129.

## DOWNY BROME

*Bromus tectorum* L.



Figure 129

Annual; tufted; plants 30—60 cm. tall; panicles drooping, 5—15 cm. long. The drooping, reddish panicles are rather ornamental, but the plants make poor, sparse feed and the sharp-pointed callus of the lemmas or the awns may penetrate the facial tissues of grazing animals. Of all the weedy European bromes, this is the commonest and most widespread. May—June. *Melica smithii* (see 56b) might be keyed here by the unwary. The plants are not hairy and it is a woodland perennial.

- 93a. Awns 2—3 cm. long; first glume about 8 mm. long. Fig. 130.

*Bromus sterilis* L.



Figure 130

Annual; tufted; culms erect; plants 50—100 cm. tall; leaf sheaths softly hairy or nearly smooth; ligules prominent, membranous, with a lacerated edge; leaf blades soft, sparsely hairy or nearly glabrous; panicles 10—20 cm. long, open, with rather stiffly spreading or drooping branches; spikelets 2.5—3.5 cm. long, with 6—10 florets; lemmas 17—20 mm. long, scabrous or stiff-pubescent; lateral teeth of the lemma about 2 mm. long. The stiff florets, provided with sharp calluses and stiff barbed awns, penetrate the facial tissues of grazing animals. Since the plants are shallow-rooted annuals, they soon dry up and their forage value becomes very low. While very widespread in the United States, *B. sterilis* is nowhere particularly common. Introduced from Europe. April—July.

93b. Awns 3—5 cm. long; first glume 1.5—2 cm. long. Fig. 131.

## RIP-GUT GRASS

*Bromus rigidus* Roth



Figure 131

Annual; tufted; plant 40—70 cm. tall; leaf sheaths and blades coarsely and sparsely hairy; ligules 3—7 mm. long, membranous, with a lacerated margin; panicles dense, with few spikelets, drooping, 7—15 cm. long, the lower branches only 1—2 cm. long. Some variants have longer lower panicle branches, hence a more open panicle. Spikelets usually with 5—7 florets; glumes glabrous; lemmas scabrous or hairy; lateral teeth 3—5 mm. long; awns strong, barbed. Because of the sharp calluses and strong, stiff awns of the lemmas, the florets readily penetrate the soft facial tissues of grazing animals, inflicting bad puncture wounds around the nose, mouth, and eyes, especially on sheep. Frequently these become infected, resulting in pink eye, cancer eye, or other disease conditions. The common name, rip-gut grass, arises from these dangerous properties of the florets. Poor, short-season feed. Introduced from Europe; especially common in California; rare in the eastern states. April—August.

94a. Lemmas awned or rarely awnless, tapering to sharp points; callus never bearing cottony hairs (see also Figs. 153 and 156).....95

94b. Lemmas awnless, not very sharp-pointed; callus frequently covered with crimped, cottony hairs .....104

95a. Plants perennial, with hard bases; leaves flat or rolled or folded; culms mostly 30 cm. tall or taller; stamens 3; florets opening at time of pollination.....96

## HOW TO KNOW THE GRASSES

- 95b. Plants slender, annual, with shallow roots and hair-like leaves; culms usually less than 20 cm. tall; stamens usually 1; florets cleistogamous. Fig. 132.

### SIX WEEKS FESCUE

*Festuca octoflora* Walt.



Figure 132

Annual; tufted, seldom over 20 cm. tall. The leaves are borne mostly in a short basal tuft. The plants may be found on poor, usually sandy ground, throughout the United States. Forage value very low. The common name refers to the very short life span. This and a number of small species of other genera, with similar growth habits, go by the name of "six weeks grasses." All may provide short-term emergency feed for range livestock after rains. April—July.

Twelve other similar species of *Festuca* occur in parts of the U. S., but are much less common. They are sometimes put in the genus *Vulpia*.

- 96a. Leaf blades flat, soft, the larger ones more than 3 mm. wide; lemmas awnless or nearly so.....97  
 96b. Leaf blades rolled or folded, firm, less than 3 mm. wide; lemmas awned or awnless.....:99  
 97a. Spikelets usually less than 10 mm. long, with 5 or fewer florets..98  
 97b. Spikelets 8—18 mm. long, with 8—10 florets. Fig. 133.

### MEADOW FESCUE

*Festuca elatior* L.

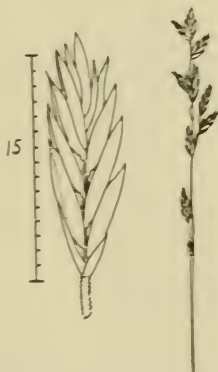


Figure 133

Perennial; tufted; plants 50—120 cm. tall; leaf blades 4—8 mm. wide; panicle 10—20 cm. long, narrow cylindrical while flowering, but contracted and spikelike afterward. This species was introduced from Europe as a forage plant and has now become widely dispersed in meadows, pastures, roadsides and waste places in the northern states. Forage value good. June—July.



- 98a. Panicle branches short, erect, bearing spikelets nearly to their bases; plants of the Rocky Mts. Fig. 134.

## SPIKE FESCUE

*Hesperochloa kingii* (S. Wats.) Rydb.



Figure 134

Perennial; tufted or sometimes bearing rhizomes; plants 40—100 cm. tall; panicles 7—20 cm. long. Spike fescue has the staminate and pistillate spikelets on separate plants (dioecious). While the spikelets are similar, the pistillate ones have well developed ovaries and abortive anthers, less than a millimeter long, while the staminate ones have large anthers, about 4 mm. long, and no ovaries. Grazed by cattle and sheep. Dry mountains, at medium altitudes. May—August. Also called *Festuca kingii*.

- 98b. Panicle branches slender, drooping; bearing spikelets only near the outer ends; Dakotas to Texas and eastward. Fig. 135.

## NODDING FESCUE

*Festuca obtusa* Biehler

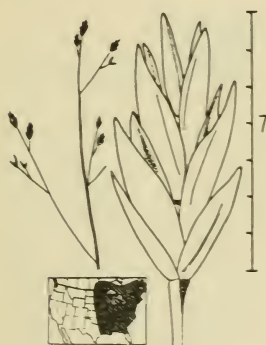


Figure 135

Perennial; tufted; plants 50—100 cm. tall; panicles usually 15—20 cm. long. Nodding fescue is a species found in forests of the eastern half of the United States. The plants grow in small clumps, with somewhat spreading culms and drooping panicles. The spikelets shatter almost before reaching full size, making it difficult to find complete ones. May—September.

A similar but rarer species is *F. paradoxa* Desv., which bears 8—20 spikelets, 4—6 mm. wide, on each lower panicle branch.

99a. Lemmas awnless ..... 100

99b. Lemmas bearing awns 2 mm. or more long..... 102



100a. Ligule very short, less than 1 mm. long.....101

100b. Ligules 2—4 mm. long. Fig. 136.

*Festuca thurberi* Vasey



Figure 136

Perennial; densely tufted; culms rather stout, 60—100 cm. tall. The involute leaves are scabrous. Panicles 10—15 cm. long, the branches separate or paired, as much as 8 cm. long, and bearing spikelets only near their ends. The long ligule is characteristic. Dry rocky slopes, 2500—3500 m. elevation. Forage value good. July—August.

101a. Leaves soft, green. Fig. 137.

*Festuca viridula* Vasey



Figure 137

Perennial; in dense tufts; culms 50—100 cm. tall; panicles open, 10—15 cm. long; branches mostly paired, 2—4 cm. long; leaf blades soft, folded or rolled; spikelets with 3—6 florets; lemmas 6—8 mm. long. The lemmas are softer than those of other species of fescue, and frequently have some purplish coloration. Well drained soils in the spruce-fir forests near timberline; mountainsides, parks, and meadows. Green fescue is one of the best forage grasses of the Northwest. It is high in palatability and nutritive value, and is eaten throughout the grazing season by all classes of livestock. July—September.

101b. Leaves stiff, bluish. Fig. 138.

**ARIZONA FESCUE; PINEGRASS**

*Festuca arizonica* Vasey



Figure 138

Perennial; densely tufted; culms about 50 cm. tall; leaves stiff, pale, rather scabrous; panicles narrow, 8—20 cm. long, with one or two spreading branches at the base. Open pine forests, mountains of the Southwest. An important grazing grass, closely related to the more northerly *F. idahoensis* (Fig. 141). July—August.

*Festuca capillata* Lam., commonly called HAIR FESCUE, is a much smaller plant, with spikelets under 5 mm. long, and short, spike-like panicles less than 5 cm. long. It occurs in lawns and waste places in the eastern states and westward to Illinois; Oregon. Introduced from Europe.

102a. New leafy shoots arising within the old sheaths; plants forming dense tufts; old sheaths not reddish nor fibrous.....103

102b. New leafy shoots breaking through the bases of the sheaths and spreading at the base, the plants hence forming loose turfs; old basal sheaths reddish brown, finally shredding into brownish threads. Fig. 139.

**RED FESCUE**

*Festuca rubra* L.

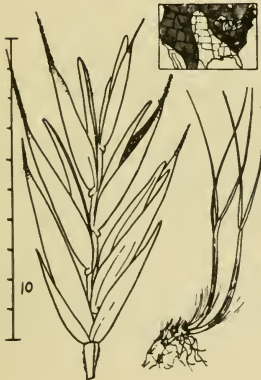


Figure 139

Perennial; tufted; culms 40—100 cm. tall; panicle slender, the short branches ascending. Wet or dry ground; widespread in the eastern United States and in the western mountains. A number of forms of this species are used in lawn mixtures. Chewings fescue and creeping red fescue are among these. Red fescue is native in Europe, Asia, and North Africa as well as North America. Most of the occurrences in the eastern states seem to be introductions, probably in lawn seed mixtures. May—July.

*Festuca occidentalis* Hook. has somewhat similar culm bases but the awns are as long as the lemmas and the long, spreading panicle branches bear spikelets only near their tips. Northwestern states; northern Michigan and Ontario.

- 103a. Leaf blades less than one half the culm length; panicles less than 10 cm. long; plants usually less than 30 cm. tall; wide-spread in the U. S. Fig. 140.

## SHEEP FESCUE

*Festuca ovina* L.

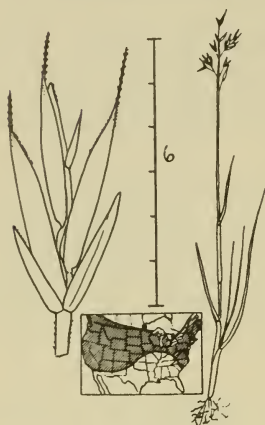


Figure 140

Perennial; tufted; 20—40 cm. tall, with a small, narrow panicle. Since the sterile leafy shoots (innovations) arise within the old sheaths, the plants form dense, bumpy tufts, making this species undesirable as a lawn grass. It frequently appears in old neglected lawns. In mass, the plants have a grayish-green color, but they do not turn brown during dry spells, as bluegrass does. Regarded as good forage in the western mountains. Native also to Europe and Asia. May—June.

Var. *brachyphylla* (Schult.) Piper is a dwarf, high altitude form found above timber line in the western mountains, where it is important for grazing. Culms 5—20 cm. tall.

- 103b. Leaf blades more than one half the culm length; plants 30—100 cm. tall; panicles 10—20 cm. long; in the western mts. Fig. 141.

## BLUEBUNCH FESCUE

*Festuca idahoensis* Elmer

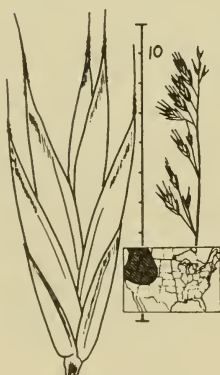


Figure 141

Perennial; forming large tufts, the densely crowded slender culms up to a meter in height. The panicles are slender, 10—20 cm. long, usually with a single longer spreading lower branch. The leaves are rough and glaucous, but not as stiff as those of the closely related Arizona fescue (see 101b). Important as a range forage grass. June—August.

- 104a. Plants producing rhizomes.....105  
104b. Plants tufted, without rhizomes.....112

## HOW TO KNOW THE GRASSES

105a. Culms round or nearly so in cross section (in pressed specimens, at least the nodes will be round).....106

105b. Culms strongly flattened, lens-shaped in cross section; spikelets never woolly. Fig. 142.

**CANADA BLUEGRASS**

*Poa compressa* L.

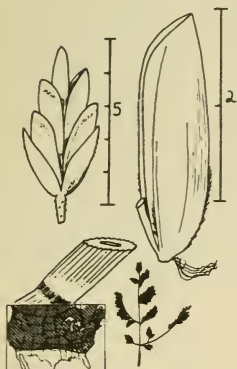


Figure 142

Perennial; rhizome-bearing; panicles narrow, 3—7 cm. long. The plants are rather wiry and form looser turf than Kentucky bluegrass. It is somewhat more drought resistant than the former species, but yields less forage. The plants bloom several weeks later than Kentucky bluegrass in the same locality. Mid-May—September. Introduced from Europe.

106a. Lemmas completely glabrous or minutely scabrous, or with a small web of cottony hairs (Fig. 143) attached to the callus.....107



Figure 143

106b. Lemmas pubescent on the keel or nerves, sometimes with a web at the base also.....108

107a. Panicles dense, with short branches, the spikelets overlapping; southern plains states or Southeast.....110b

107b. Panicles open, the slender spreading branches naked at the base; western mountains .....109b

108a. Lemmas pubescent only on the nerves; glabrous between them .....109

- 108b. Lemmas pubescent on the nerves and also between them near the base. Fig. 144.

## PLAINS BLUEGRASS

*Poa arida* Vasey



Figure 144

Perennial; producing rhizomes; culms 20—60 cm. tall; leaf blades borne mostly near the base of the plant, folded, 2—3 mm. wide; panicle dense, cylindrical, 2—10 cm. long, with short branches; spikelets 5—7 mm. long, the first glume with one nerve; anthers about 1.5 mm. long. Salty or alkaline meadows, up to 3000 m. elevation; an important forage grass on the Great Plains. June—?

*Poa glaucifolia* Scribn. & Will. is similar. The first glume has 3 nerves; anthers about 2.5 mm. long; panicles more open; herbage glaucous. Moist ground and open woods; Minn. to B. C., to Nev. and N. M.

- 109a. Lemmas bearing a web of cottony hairs at the base; sheaths glabrous .....110

- 109b. Lemmas without a web of hairs; lower sheaths glabrous or pubescent. Fig. 145.

*Poa nervosa* (Hook.) Vasey



Figure 145

Perennial; producing rhizomes; culms 30—70 cm. tall, in large, leafy tufts; leaf blades flat or folded; ligules 1—2 mm. long; panicles open, usually 5—10 cm. long, with drooping branches which are naked at the base. The lemmas vary from entirely glabrous to hairy on the nerves or scaberulous. This species is highly variable in the hairiness of both sheaths and lemmas. In common with most of the native and introduced bluegrasses, it is a valuable forage plant for domestic grazing animals and wild herbivores. Dry soil in open woods, intermediate altitudes. May—August.

- 110a. Panicles open, the long branches naked at the bases.....111



- 110b. Panicles dense and compact, cylindrical, with overlapping spikelets. Fig. 146.

**TEXAS BLUEGRASS**

*Poa arachnifera* Torr.



Figure 146

Perennial; rhizomes present; plants producing leafy tufts; culms 30—75 cm. tall; leaf blades dark green, 2—4 mm. wide, scabrous on the upper surface; panicles lobed, 5—12 cm. long; spikelets usually with 5—10 florets. The staminate and pistillate spikelets are on different plants, and the two kinds are quite different in appearance. The pistillate panicles are woolly due to the presence of copious cottony webs on the lemmas. The staminate inflorescences are not woolly, their lemmas having only small webs or none at all. The plants are succulent and very leafy; they provide excellent forage in winter and spring. Sometimes cultivated for forage in the southeastern states. April—May.

*Poa macrantha* Vasey is also dioecious. It is a sand-binder on the coastal dunes from Washington to northern California. The plants have extensive rhizomes and stolons. Spikelets large, about 12 mm. long; webs scanty.

- 111a. Lower panicle branches mostly in pairs; lemmas 3.5—5.4 mm. long; anthers 2.0—3.5 mm. long. Fig. 147.

*Poa cuspidata* Nutt.

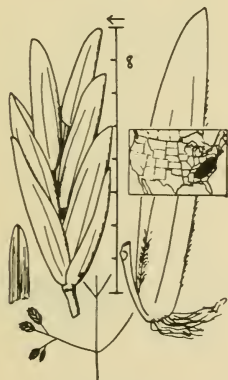


Figure 147

Perennial; rhizomes present; culms 30—50 cm. tall; plants growing in large tufts, with numerous long basal leaves nearly as long as the culms; leaf blades soft, 2—3 mm. wide; upper culm blades very short, rounded to an abrupt tip; panicles 7—12 cm. long, very open, pyramidal, the spikelets all borne at the outer tips of the branches. This is the earliest blooming of all the native eastern grasses, usually beginning to flower in early April in the North. It is a plant of the central and southern Appalachians, where it is commonly found on rocky banks and dry wooded hillsides. Unlike Kentucky bluegrass, which it resembles, it completely

lacks aggressive or weedy tendencies.

- 111b. Lower panicle branches mostly in whorls of 5; lemmas 2.4—3.6 mm. long; anthers 1.0—1.8 mm. long. Fig. 148.

## KENTUCKY BLUEGRASS

*Poa pratensis* L.

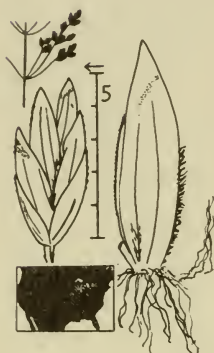


Figure 148

Perennial; rhizomes present; culms 30—100 cm. tall, in dense clumps with numerous sterile leafy shoots (innovations); panicles open, pyramidal, somewhat contracted after flowering. Kentucky bluegrass is one of our most widely distributed introduced grasses and is much used for lawns and pastures in the northern states. It is extensively naturalized in pastures, prairies, roadsides, open woods and waste ground. April—July. Introduced from Europe.

- 112a. Lemmas bearing a web.....113
- 112b. Lemmas glabrous or pubescent, but without a web.....118
- 113a. Marginal nerves of lemmas pubescent.....114
- 113b. Marginal nerves of lemmas glabrous.....117
- 114a. Lemmas glabrous between the nerves; ligules of upper culm leaves 2.5—7 mm. long.....115
- 114b. Lemmas pubescent between the nerves; ligules almost always less than 2 mm. long.....116

## HOW TO KNOW THE GRASSES

- 115a. Lemmas greenish-yellow, thin, with prominent intermediate nerves; sheaths usually scaberulous. Fig. 149.

**ROUGH STALK BLUEGRASS; TRIVIALIS**

*Poa trivialis* L.

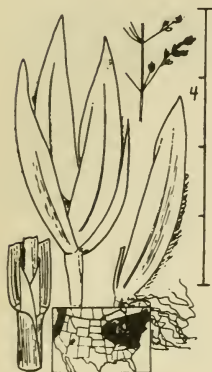


Figure 149

Perennial; tufted; culms 30—100 cm. tall, often somewhat bent or reclining at the base; panicles open, ovoid or pyramidal, the spikelets clustered near the outer ends of the branches; lemmas glabrous or hairy on the lateral nerves. The plants are often found growing wild in wet places, and the seed is planted in lawn mixtures for shady places. May—June. Introduced from Europe.

- 115b. Lemmas green, usually purple or bronzy at the tip, the intermediate nerves inconspicuous; sheaths smooth. Fig. 150.

*Poa palustris* L.

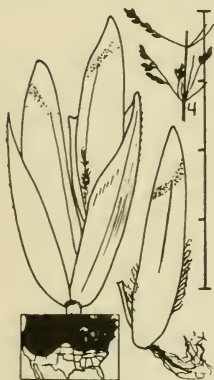


Figure 150

Perennial; plants slender, weak, with bent and reclining (decumbent) culm bases; panicles open, pyramidal, with slender, weak branches. The lemmas are usually purple and golden banded near the tip, making them very attractive under the lens. Wet meadows, stream banks, and moist woods; seldom numerous in one place. June—August. This species is native to both North America and Eurasia.

*Poa interior* Rydb. is very similar to the above, but has erect, tufted culms, small panicles less than 10 cm. long, and short ligules usually 1 mm. long or shorter. Across Canada and south to northern New England, Wisconsin, North Dakota and the high plains

and western mountain states.

## HOW TO KNOW THE GRASSES

- 116a. Panicles cylindrical, 10—20 cm. long, the branches 3—6 in a whorl; lower branches drooping.....See *P. sylvestris* under *P. alsodes*, 117b.
- 116b. Panicles pyramidal, 5—10 cm. long, the branches 1—2 at a node, ascending.....See *P. interior* under *P. palustris* 115b.
- 117a. Upper ligules 3—7 mm. long; sheaths usually scaberulous; intermediate nerves of lemmas conspicuous.....115a
- 117b. Upper ligules 0.5—2 mm. long; sheaths smooth; intermediate nerves of lemmas inconspicuous. Fig. 151.

*Poa alsodes* A. Gray

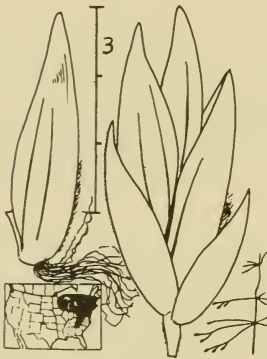


Figure 151

Perennial; tufted; plants slender, 30—60 cm. tall, erect and graceful, with very open, delicate, cylindrical panicles, 10—25 cm. long and half as wide. The slender branches bear a few spikelets near their tips. Cool rocky woods or wooded flood plains in the northeastern states and the Appalachians. May—June.

*Poa sylvestris* A. Gray is found also in rich woods and resembles this species, but has lemmas which are hairy between the nerves. New York to Wisconsin, southward to Florida and Texas. May—July.

- 118a. Lemmas pubescent between the nerves, the hairs often very short ..... 119
- 118b. Lemmas glabrous between the nerves.....120

- 119a. Panicles very open, the branches slender, spreading, usually in pairs, bearing spikelets only near their outer ends; lemmas with conspicuous long hairs on their keels; eastern forested half of the U. S., to Michigan and Texas. Fig. 152.

*Poa autumnalis* Muhl.



Figure 152

Perennial; tufted; plants delicate, 30—60 cm. tall; panicles 10—20 cm. long and nearly as wide, their branches very slender, bearing a few spikelets near the tips. Leaf blades 2—3 mm. wide, many at the base of the plants. The plants are not, as the name would seem to indicate, autumn blooming. Moist woodlands. June.

- 119b. Panicles usually dense, the branches bearing spikelets nearly to their bases; nerves of lemmas not bearing long hairs; western states, eastward to Minnesota and to the Dakotas. Fig. 153.

*Poa scabrella* (Thurb.) Benth.

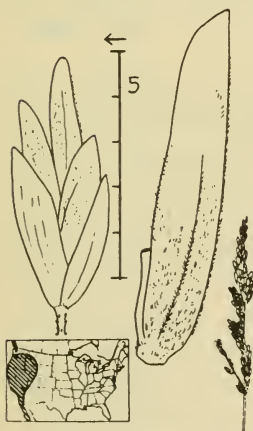


Figure 153

Perennial; tufted; culms 50—100 cm. tall; panicles slender, elongated, with ascending branches. This species and its relatives have lemmas covered, at least near their bases, with short crimped or appressed hairs. A number of very closely related species or forms exist in this group, differing mostly in the shape of the panicle. All are bunch grasses of the western states and are valuable forage grasses at lower and medium altitudes. March—August.



- 120a. Midnerve and lateral nerves of lemmas pubescent.....121  
 120b. Lemmas glabrous or minutely scaberulous, not pubescent...122  
 121a. Spikelets 6—8 mm. long; keels and marginal nerves of lemmas pubescent; intermediate nerves inconspicuous, not pubescent.  
 Fig. 154.

**MUTTON GRASS**

*Poa fendleriana* (Steud.) Vasey



Figure 154

Perennial; erect, densely tufted bunch grass; leaves mostly basal, stiff and scabrous, folded or rolled, 1—2 mm. wide; culms 30—50 cm. tall, not much exceeding the basal leaves; panicles dense, oblong, 2—7 cm. long, the pale spikelets overlapping. The plants are dioecious but the spikelets of both sexes are similar. Ligules short, less than 1 mm. long. Medium altitude hills and dry forests in the western mountains, from 2300—4000 m. It is regarded as one of the best of the western forage grasses, especially for sheep. April—July.

*Poa longiligula* Scribn. & Will. is very similar, but has ligules up to 5—7 mm. long. Range about the same as the preceding species.

- 121b. Spikelets 4—6 mm. long; keels, intermediate nerves, and marginal nerves of lemmas conspicuous, usually all pubescent. Fig. 155.

**ANNUAL BLUEGRASS**

*Poa annua* L.

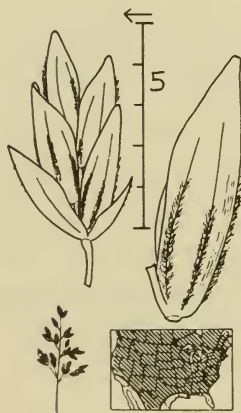


Figure 155

Annual; tufted. The diminutive light green plants, usually less than 20 cm. tall, are soft, weak, and spreading. Panicles 3—7 cm. long, pyramidal, with short, spreading branches. The plants sometimes grow in shallow water, then becoming long, slender, and rooting at the nodes. This species begins growth in fall or early spring and blooms very early, and may die out when hot weather comes. Some blooming also occurs in fall. Lawns, paths, margins of water and open woods, roadsides. Introduced from Europe.

122a. Panicles short, ovoid, 2—8 cm. long; spikelets ovate in outline, about twice as long as wide; glumes and lemmas keeled; nerves of lemmas rather conspicuous.....123

122b. Panicles elongated, cylindrical, 10—15 cm. long; spikelets little keeled, narrowly elliptical in outline, 3 or more times longer than wide, the glumes and lemmas rounded on the back; nerves of lemmas inconspicuous. Fig. 156.

*Poa nevadensis* Vasey

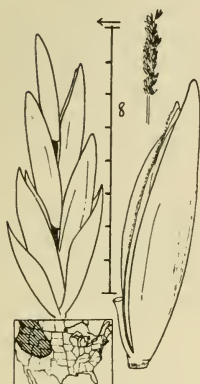


Figure 156

Perennial; tufted; culms erect, 50—100 cm. tall; sheaths scabrous; panicle narrow, elongated, 10—15 cm. long. This is one of a group of very similar bunchgrasses of the western mountain states. All have slender, elongated spikelets, whose lemmas are not keeled; lemmas glabrous and with inconspicuous nerves. They furnish excellent range forage for wild game animals and domestic livestock. Plains, dry meadows; open or partially wooded mountainsides, from near sea level up to 3700 m. elevation. May—September.

123a. Leaf blades scabrous; ligules of culm leaves less than 2 mm. long. Fig. 157.

*Poa cusickii* Vasey



Figure 157

Perennial; culms in dense bunches, 20—60 cm. tall; basal leaf blades thread-like, very scabrous, about half the length of the culms; ligules usually under 1 mm. long; panicles 3—8 cm. long, dense, oblong, pale or somewhat purplish. Rocky slopes and sagebrush plains, medium to high altitudes. May—July.

123b. Leaf blades glabrous; ligules of culm leaves 2—4 mm. long.  
Fig. 158.

*Poa epilis* Scribn.



Figure 158

Perennial; culms in small tufts; plants 20—40 cm. tall; leaf blades of the culms short, flat, 2—3 mm. wide, their ligules 2—4 mm. long; basal leaves long, folded or rolled; panicles on long, thin peduncles; panicles short, dense, oblong, 2—6 cm. long; spikelets about 5 mm. long, usually with 3 florets; lemmas 4—6 mm. long, sometimes scaberulous. *Poa epilis*, sometimes called "skyline bluegrass," is an important high altitude forage grass, usually found above timberline on steep slopes and in mountain meadows. July—August.

About five similar species are to be found at high altitudes in the western mountains, mostly above timberline. They are all dwarf, rarely more than 20 cm. tall.



TRIBE III. HORDEAE

1a. One spikelet borne at each node of the rachis.....2

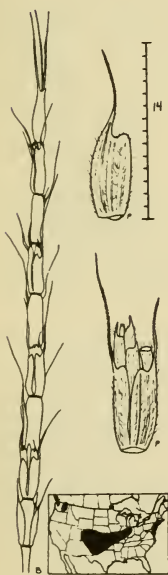
1b. Two or more spikelets borne at some or all of the nodes of the rachis (some spikelets may be reduced to awned rudiments)...10

2a. Rachis not breaking up at maturity, the joints thin and flat....3

2b. Rachis breaking into individual joints at maturity; joints much thickened at their upper ends; spikes cylindrical. Fig. 159.

GOATGRASS

*Aegilops cylindrica* Host



Annual; tufted; 40—60 cm. tall; much branched from the base, one plant bearing as many as 60 spikes; spikes 5—10 cm. long; joints of the rachis 6—8 mm. long, the spikelets slightly longer and fitting closely into the contour of the joints; spikelets glabrous or hairy, with 2—5 florets; lower spikelets nearly awnless, the upper ones bearing awns up to 5 cm. long; glumes thick and stiff, bearing a pronounced tooth at one side of the awn. Goatgrass was presumably introduced into the Middle West in Turkey wheat brought to the United States by Russian immigrants in the 1870's. The plants are winter-annual, beginning growth in the fall and seeding out from May to July. They crowd out wheat when they are numerous. The seeds travel as contaminants in wheat seed.

*Aegilops triuncialis* L. is similar but has three awns on each glume. It is a bad weed on range land in California; introduced from Europe.

Figure 159

3a. Spikelets placed flatwise against the rachis; both glumes present...4

- 3b. Spikelets placed edgewise to the rachis; only the glume away from the rachis present. Fig. 160.

**RYEGRASS**

*Lolium perenne* L.



Figure 160

Winter annual or short-lived perennial; culms 30—60 cm. tall; leaves dark green. The lemmas are awnless or nearly so. Ryegrass is much used in lawn seed mixtures, since the seed germinates rapidly and gives a green turf quickly, but the plants tend to die out when hot weather arrives. Lawns, fields, waste places, stream banks. Widely distributed through the U. S. This species and the variety listed below furnish good cool season forage. Introduced from Europe. May—July.

Variety *italicum* Parn. (ANNUAL RYEGRASS). This is barely distinct from the preceding species. It tends to have larger stature, more florets per spikelet, and awned lemmas, but there are many intermediates.

*Lolium temulentum* L. (DARNEL). Darnel may be recognized by the very long glume, which exceeds the tip of the uppermost lemma. The lemmas are awned. Weed in grainfields and waste places, especially on the Pacific Coast and in the Southeast. This species is sometimes poisonous to livestock and human beings when eaten. Introduced from Europe.

- 4a. Spikelets with 3 or more florets; lemmas without stout bristles on the keels .....5

- 4b. Spikelets with 2 florets; lemmas bearing short, stiff bristles along the keel; cultivated annual. Fig. 161.

**RYE**

*Secale cereale* L.

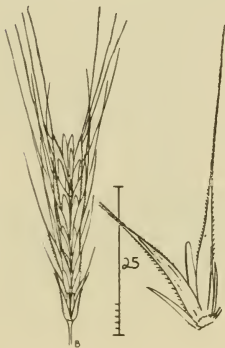


Figure 161

Rye resembles wheat in general appearance, but has a more slender spike. The lemmas are strongly V-shaped in cross section and have rows of vicious, upwardly-pointed barbs along keel and margins. Rye culture is confined mostly to the northern states. The plants may be found scattered along roads and in waste places in regions where it is grown. Summer. Introduced from Europe. Elongated blackish horns protruding from spikelets are ergot, a poisonous fungus used in medicine.



## HOW TO KNOW THE GRASSES

5a. Glumes lanceolate, acute, more than twice as long as wide; grain remaining inclosed by the lemma and palea; plants perennial. . . . 6

5b. Glumes broadly ovate, blunt, less than twice as long as wide; grain falling free of the lemma and palea; cultivated annual. Fig. 162.

### WHEAT

*Triticum aestivum* L.



Figure 162

Wheat is the most extensively cultivated of the small grains and may be found growing in fields, waste places and roadsides as the result of seed being scattered accidentally. Some varieties of wheat have awned lemmas, others are awnless. Two primitive kinds of wheat, EMMER and SPELT, have spikes with a brittle rachis which breaks into individual joints at maturity. Both are occasionally grown as feed grains in dry regions. All introduced from the Old World.

6a. Plants producing creeping rhizomes. . . . . 7

6b. Plants lacking rhizomes. . . . . 8

7a. Leaves bluish glaucous, often inrolled; upper leaf surface furrowed, with 7—14 ridges across the width. Fig. 163.

### WESTERN WHEATGRASS

*Agropyron smithii* Rydb.

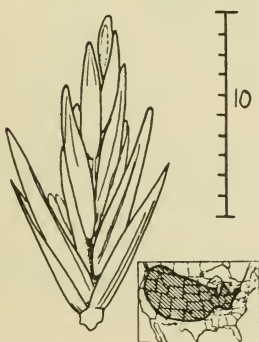


Figure 163

Perennial; culms 30—60 cm. tall; leaves heavily glaucous, so that patches of the plants have a conspicuous blue or silvery color when viewed from a distance. Spikes slender, with erect spikelets. This is essentially a plant of the mountain and plains states of the West, but is occasionally found farther east. In the western parts of its range it is a source of forage on moist alkaline soil. Farther east, it grows on dry uplands, railroad embankments, etc. June—August.

- 7b. Leaves flat, usually green; upper surface of blades finely nerved, with 25—40 nerves across the width. Fig. 164.

## QUACKGRASS

*Agropyron repens* (L.) Beauv.

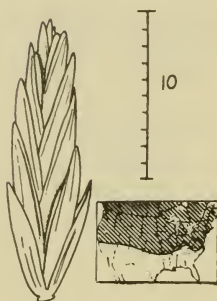


Figure 164

Perennial; with extensive creeping rhizomes; culms 50—100 cm. tall; leaves flat, green, often hairy on the upper surface; spike slender, with erect spikelets. Some of the plants have awned lemmas. Quackgrass is one of the worst grass weeds in the northern states. It produces good forage but is not intentionally planted as a crop. Waste ground, roadsides, fields and meadows. May—July. Introduced from Europe.

- 8a. Spikelets erect, pressed against the rachis; rachis joints at least 5 mm. long .....9

- 8b. Spikelets spreading away from the rachis, overlapping; rachis joints about 1 mm. long . Fig. 165.

## CRESTED WHEATGRASS *Agropyron desertorum* (Fisch.) Schult.

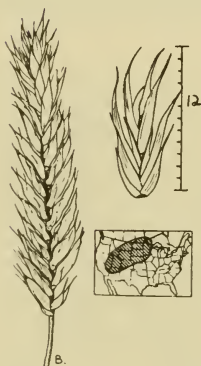


Figure 165

Perennial; tufted; culms 60—100 cm. tall. The strongly divergent spikelets distinguish this species from all others of this genus. Crested wheatgrass is a recent introduction from the Old World and has proved very useful for re-grassing abandoned crop lands and depleted ranges in the northern great plains states. A valuable forage species. June—August. Formerly known as *Agropyron cristatum*.

## 9a. Lemmas awnless or with straight awns. Fig. 166.

*Agropyron trachycaulum* (Link) Steud.

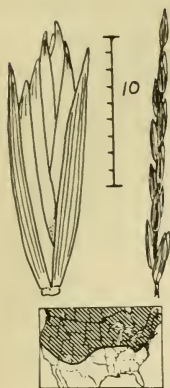


Figure 166

Perennial; tufted; culms 50—100 cm. tall; spikes and spikelets slender; glumes conspicuously nerved. Awned and awnless forms occur, often in the same stand of plants. This is an important forage species in the western mountains. Moist grassland and open woods. As here discussed, this species includes what are called *A. pauciflorum* (awnless) and *A. subsecundum* (awned). June—September.

## 9b. Lemmas with strongly bent awns. Fig. 167.

**BLUEBUNCH WHEATGRASS** *Agropyron spicatum* (Pursh) S. & S.

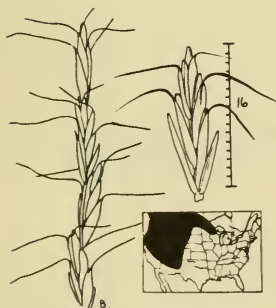


Figure 167

Perennial; tufted; culms 60—100 cm. tall. The spikes are slender and delicate. Sheaths smooth; blades 1—4 mm. wide, hairy on the upper surface. This species is one of the most abundant and important forage species of the northwestern states, and is readily eaten at all seasons and by all kinds of livestock. Dry plains and open mountain slopes. May—August.

- 10a. Spikelets with 1 floret; 3 spikelets at each node of the rachis, the lateral pair sometimes reduced to awns.....11
- 10b. Spikelets with 2 or more florets, 2 or more spikelets at some or all nodes; all spikelets alike and fertile.....13
- 11a. Rachis of spikes separating at maturity into individual joints, each bearing 3 spikelets; wild plants.....12

- 11b. Rachis of spikes not separating into joints; cultivated annual.  
Fig. 168.

**BARLEY**

*Hordeum vulgare* L.



Figure 168

Annual; tufted; culms usually 60—120 cm. tall; leaf blades flat, usually 5—15 mm. wide, with prominent auricles; spikes stiff and erect; spikelets 3 at each node of the rachis; each spikelet with a single fertile floret; glumes awned; lemma with a stout awn, usually 10—15 cm. long and very scabrous; rachilla prolonged behind the palea as a small bristle. In the hooded barleys, the lemmas lack awns but bear minute abortive extra lemmas at their tips, in inverted position. Common strains of barley are 6-rowed, that is, all 3 spikelets at each node develop grains. There are also 2-rowed barleys, in which only the central spikelet of each trio develops a grain. Barley is cultivated for the grain, which is used for human food (pearl barley, cereals), for production of malt, and for livestock feed. It is grown principally in the Middle West and in the Great Valley of California. Stray plants may grow from scattered seed, but barley is never found growing as a truly wild plant.

- 12a. Awns mostly 5—8 cm. long; plants perennial. Fig. 169.

**FOXTAIL BARLEY**

*Hordeum jubatum* L.

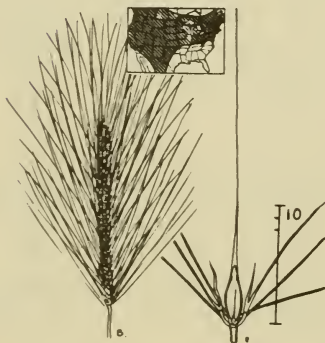


Figure 169

Tufted; culms 30—60 cm. tall. The bushy spikes are 5—10 cm. long, and because of the spreading awns, about as wide. When still fresh, the awns often have a purplish or pink sheen. When the spikes are ripe, they break up into segments, each with a sharp-edged rachis joint at its base, and a trio of spikelets at its apex. Only the central spikelet is fertile, and the lateral two are reduced to long awns. The spike-segments are able to penetrate clothing, wool, or flesh, causing puncture wounds, espe-

cially around the faces of animals. For this reason, foxtail barley is undesirable as a forage plant. Open ground, mostly in the mid-western and western states. May—August.

12b. Awns less than 2 cm. long; plants annual. Fig. 170.

## LITTLE BARLEY

*Hordeum pusillum* Nutt.

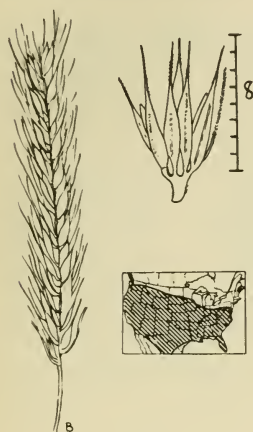


Figure 170

Annual; culms 10—35 cm. tall, in small tufts. Both glumes of the central spikelet and the inner one of each lateral spikelet are broadened above the base. The plants furnish some early season forage, but are rejected by livestock after the spikes emerge. Plains and open ground; common in the Middle West and westward. February—July.

*Hordeum brachyantherum* Nevski is similar, but all of the glumes are narrow. Western mountain states, not common in the East. Introduced from Europe.

*Hordeum leporinum* Link has thicker spikes which are nearly square in cross section and partially hidden in the uppermost sheath. Glumes of the central spikelet hairy on the edges. Mostly in the plains

and mountain states. Introduced from Europe.

13a. Glumes nearly as long as the lowermost floret; spikelets erect, pressed against the rachis.....14

13b. Glumes very short or lacking; spikelets spreading at right angles to the rachis. Fig. 171.

## BOTTLEBRUSH

*Hystrix patula* Moench

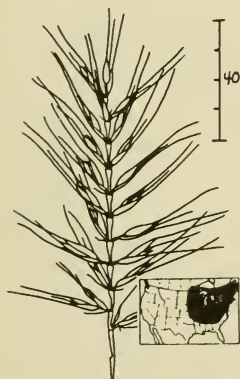


Figure 171

Perennial, in small tufts; culms slender, 60—120 cm. tall. Spikes 8—15 cm. long, very open, because of the spreading spikelets. Leaf sheaths smooth or hairy; blades usually 7—15 mm. wide. This is a characteristic grass of damp woodlands throughout the eastern wooded sections of the country. In var. *bigeloviana* (Fern.) Deam, the lemmas are hairy. June—August.



14a. Rachis of spikes not breaking up when ripe.....15

14b. Rachis of spikes breaking up into individual joints, each bearing 2 spikelets, when ripe. Fig. 172.

**SQUIRRELTAIL**

*Sitanion hystrix* (Nutt.) J. G. Smith

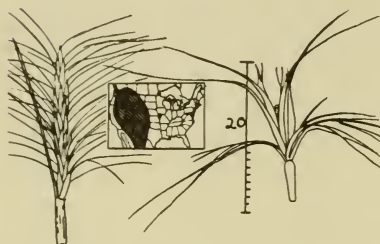


Figure 172

Perennial; tufted; culms 10—50 cm. tall, erect or spreading. The glumes bear one or two long, bent awns. The plants resemble *Hordeum jubatum* but the several florets per spikelet and two spikelets per node separate it from that species. The rachis joints bearing the awned spikelets, may penetrate the facial parts of grazing animals, causing serious inflammation, pink eye, etc.

Fair forage when seed heads are not present. Dry woods and grasslands. April—September.

*Sitanion jubatum* J. G. Smith is similar but has three or more awns on each glume. Intermountain and Pacific Coast States.

15a. Plants lacking rhizomes or rarely with short, thick ones.....16

15b. Plants producing slender creeping rhizomes; ligule 1 mm. long. Fig. 173.

*Elymus triticoides* Buckl.



Figure 173

Perennial; culms usually 60—120 cm. tall, single or in small tufts, forming large patches by means of the long, slender rhizomes. The leaves are harsh, stiff, bluish-glaucous and often rolled. Damp or saline soils, open ground. Sometimes part of the spike will have only a single spikelet at a node. Seven other species of *Elymus* produce extensive rhizomes. They are mostly plants of sand dunes along the oceans or in river valleys. May—August.

- 16a. Glumes very narrow, widest at the base and tapering upward, less than 1 mm. broad.....17
- 16b. Glumes flattened, wider near the middle than at the base, the middle portions with several nerves.....18
- 17a. Lemmas awnless or with awns shorter than the body of the lemma; plants of the Great Plains and western mountains and deserts. Fig. 174.

## GIANT WILD RYE

*Elymus cinereus* Scribn. & Merr.

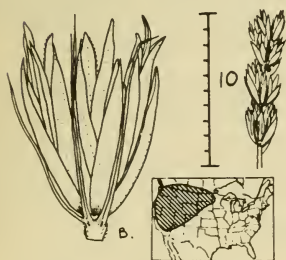


Figure 174

Perennial; tufted; rarely with short, thick rhizomes; culms about 1 m. tall; leaves thick, stiff, flat or rolled; ligules 3—6 mm. long; spikes 15—30 cm. long. This is an important forage grass of dry plains, sand hills, and ditches in the western states. May—August.

*Elymus condensatus* Presl is a very tall species, up to 3 m. high, with large, often compound spikes, up to 50 cm. long and 3 cm. thick. It grows along the Pacific sea beaches in California.

- 17b. Lemmas with awns at least as long as the body; plants of woodlands; eastern states and westward to Wyoming and Texas. Fig. 175.

*Elymus villosus* Muhl.

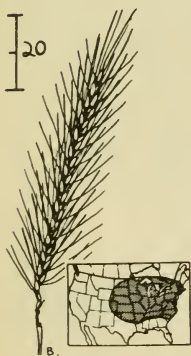


Figure 175

Perennial; tufted; culms slender, 60—100 cm. tall; leaf blades thin and dark green, their upper surfaces velvety to the touch; spikes 5—12 cm. long; spikelets usually densely hairy; glumes 12—20 mm. long; lemmas 7—9 mm. long, with an awn 1—3 cm. long. Stream banks, thickets, and moist woods. June—August.

- 18a. Spikes loose and curved; awns strongly recurved when dry; bases of glumes thin and flat. Fig. 176.

CANADA WILD RYE

*Elymus canadensis* L.

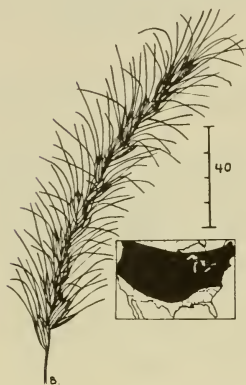


Figure 176

Perennial; tufted; culms erect or arching, bearing large, bristly spikes up to 25 cm. long. The lemmas are rather coarsely hairy. Canada wild rye is our most widespread species and is common over much of its range. It has been experimentally planted for forage production in the Middle West. Prairies, open ground, rocky banks and open woods. July—September.

*Elymus riparius* Wiegand is very similar but has awns which are straight even when mature and dry. The lemmas are scabrous, not hairy as in *E. canadensis*. Quebec to North Carolina, west to Nebraska and Arkansas.

- 18b. Spikes stiff and straight; awns straight; bases of glumes round in cross section, hard and smooth. Fig. 177.

VIRGINIA WILD RYE

*Elymus virginicus* L.

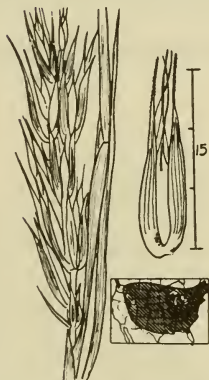


Figure 177

Perennial; tufted; culms stiffly erect, 60—120 cm. tall; the base of the spike often hidden in the uppermost sheath. The "bow-legged" glumes are a good mark of recognition. Awned and awnless forms, as well as forms with smooth or hairy lemmas, are known. The plants are extremely variable in size and growth habit. The bases of the glumes are usually yellowish. Woods, thickets, stream banks, open ground. June—September.

TRIBE IV. AVENEAE

- 1a. Spikelets disarticulating above the glumes.....2
- 1b. Spikelets disarticulating below the glumes.....12
- 2a. Lemmas with 9 awns each....See Fig. 41 (*Enneapogon desvauxii*).
- 2b. Lemmas with a single awn.....3
- 3a. Spikelets (excluding awns) 9 mm. long or shorter.....4
- 3b. Spikelets over 1 cm. long.....10
- 4a. Lemmas bearing an awn on the back (or if awnless, with slender hairy rachilla joints) .....5
- 4b. Lemmas awnless or with a very short awn arising at the split tip of the lemma; rachilla joints very short. Fig. 178.

JUNEGRASS

*Koeleria cristata* (L.) Pers.



Figure 178

Perennial; tufted; culms 30—60 cm. tall; panicles yellowish or silvery in color, narrowly cylindrical or somewhat lobed. At blooming time the branches spread but later close up again. Spikelets with 2—4 florets. Junegrass is one of the most widely distributed of American grasses. Dry or sandy soil; prairies or open woods. Also found in Eurasia. June—September.

- 5a. All florets alike and perfect; spikelets 2—6 mm. long.....6

- 5b. Lower floret staminate, with a bent, protruding awn; upper floret perfect, with a short straight awn; spikelets 7—9 mm. long. Fig. 179.  
**TALL OATGRASS** *Arrhenatherum elatius* (L.) Mert. & Koch



Figure 179

Perennial; tufted; culms 1—1.5 m. tall; leaf blades 5—10 mm. wide; panicles narrow and elongated, but with spreading short branches, 15—30 cm. long; glumes thin and somewhat translucent. Rarely both florets have bent awns. Tall oatgrass is cultivated in the northern states as a meadow grass and has freely escaped to roadsides and waste ground. May—September. Introduced from Europe.

- 6a. Awn attached near the base of the lemma.....7  
 6b. Awn attached above the middle of the lemma or absent.....8  
 7a. Rachilla prolonged beyond the base of the upper floret as a minute hairy bristle. Fig. 180.

## HAIRGRASS

*Deschampsia caespitosa* (L.) Beauv.

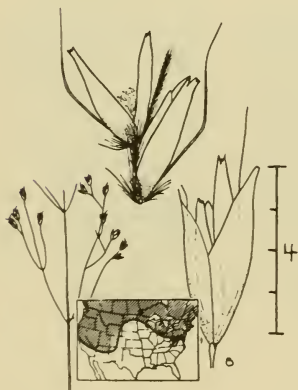


Figure 180

Perennial; tufted; culms slender, 60—120 cm. tall; leaves flat and scabrous, mostly at the base of the plants, 1—4 mm. wide; panicles open, delicate; spikelets often purple. The awns are nearly hidden within the glumes. The lemmas have several minute teeth at their tips. Bogs, wet ground, mountain meadows. An important forage grass in the West. May—July.

*Deschampsia flexuosa* (L.) Trin. is similar but the awns are strongly bent and protrude from the spikelets. Leaf blades fine and hair-like. Arctic North America, southward to Minnesota and Michigan and southward in the Appalachian Mts. to Georgia; Arkansas and Oklahoma.



7b. Rachilla not prolonged beyond the base of the upper floret. Fig. 181.

**SILVER HAIRGRASS**

*Aira caryophyllea* L.

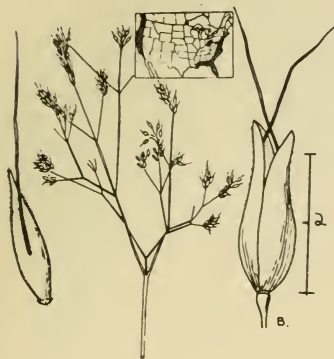


Figure 181

Annual; tufted; culms 10—35 cm. tall. The plants look like delicate little trees with open crowns. The silvery spikelets are closely clustered at the tips of the branches. Dry ground, mostly in the Atlantic and Pacific coastal regions. Introduced from Europe. April—July.

8a. Spikelets disarticulating above the glumes.....9

8b. Spikelets disarticulating below the glumes and falling entire. Fig. 182.

*Trisetum pennsylvanicum* (L.) Beauv.

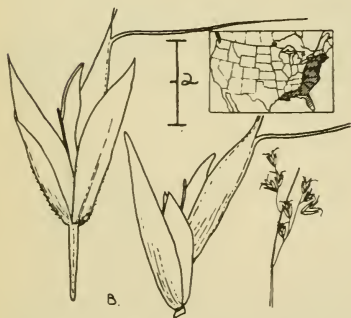


Figure 182

Perennial; culms slender and weak, 50—100 cm. tall; tufted. The spikelets are very flat and fall with about half of the pedicel attached. Meadows, swamps, and wet ground. May—June.

*Trisetum interruptum* Buckl. has similar spikelets but a dense, spikelike panicle. Open dry plains, Texas to Colorado and Arizona. March—May.

9a. Awn short, concealed within the glumes, or absent. Fig. 183.

*Trisetum wolfii* Vasey

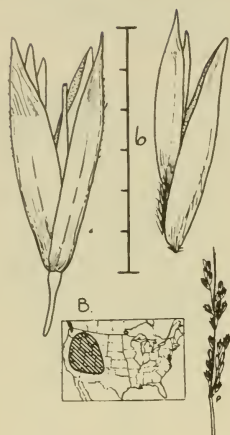


Figure 183

Perennial; tufted or sometimes with short rhizomes; culms 50—100 cm. tall; leaf blades flat, 2—4 mm. wide, scabrous on the upper surface; panicles dense, cylindrical, yellowish. An important forage grass in moist mountain meadows at mid-altitudes in the western mountains. July—September.

9b. Awn protruding from the glumes, bent and twisted. Fig. 184.

**SPIKE TRISETUM**

*Trisetum spicatum* (L.) Richt.

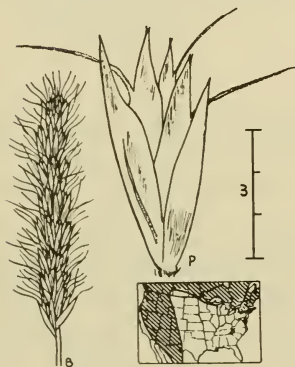


Figure 184

Perennial; tufted; culms 15—50 cm. tall; foliage smooth or finely hairy; panicles spikelike, dense, shaggy with many protruding awns, purplish or golden. An important forage grass at high altitudes, on slopes and in mountain meadows in the western mountains. The plants furnish good forage throughout the growing season, especially for cattle and horses. June—August.

10a. Awn attached between 2 teeth at the tip of the lemma; spikelets with 3 or more florets.....11

- 10b. Awn attached on the back of the lemma; spikelets with 2 or 3 florets. Fig. 185.

## WILD OATS

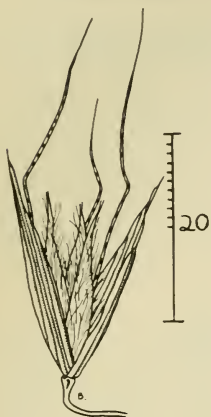


Figure 185

## *Avena fatua* L.

Annual; culms usually 30—100 cm. tall, in small tufts; panicles open, up to 30 cm. long. The spikelets when ripe are open, bell-shaped, with conspicuous protruding bent awns. The scar at the base of the floret is circular and prominent and is usually called a "sucker mouth." Wild oats is distinguished by the hairy lemmas, prominent awns and the sucker mouth. It is widely dispersed in the United States but is most common in the Pacific Coast States, where it is a prevalent weed and is sometimes cut for hay. May—August.

*Avena sativa* L. (CULTIVATED OATS) Fig. 186 differs from wild oats in having lemmas which are glabrous except on the callus, no sucker mouth, and weak, usually straight awns. Widely cultivated and growing from scattered seed on roadsides and waste ground.



Figure 186

- 11a. Lemmas glabrous except for the hairy edges and callus; plants of the western mountains. Fig. 187.

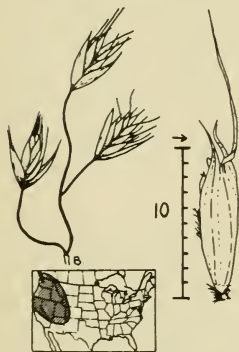


Figure 187

## *Danthonia californica* Bolander

Perennial; tufted; culms 30—80 cm. tall, tending to break at the joints. The panicle is small, consisting of 2—5 large spikelets on spreading pedicels. In this and other species of *Danthonia*, the lower sheaths may be swollen and contain slender, much distorted cleistogamous spikelets called "cleistogenes." The culms break off just below the node where a cleistogene is present. Meadows and open woods. Of some value for forage. May—August.

*Danthonia intermedia* Vasey has the few spikelets borne in a dense, tuft-like panicle, 2—5 cm long. Arctic North America, southward to Michigan and at high altitudes in western states. Grazed by livestock. July—September.

- 11b. Lemmas hairy on the back as well as the edges; plants wide-spread in the United States. Fig. 188.

## POVERTY OATGRASS

*Danthonia spicata* (L.) Beauv.

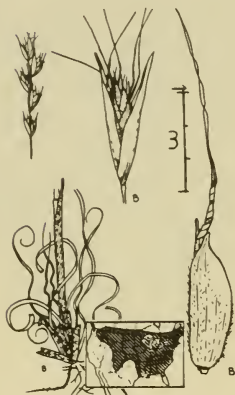


Figure 188

Perennial; tufted; culms usually 20—50 cm. tall. Most of the short, curly leaves are borne in a basal tuft. Their ligules are under 1 mm. long. Panicles short, 2—5 cm. long, with ascending branches. Poverty oats makes gray-green mats or sods on dry, sterile soils in the open or in thin woods. Forage value very low. Cleistogenes may be present, as in *D. californica*. May—September.

*Danthonia compressa* Austin has panicles with spreading branches. The ligules of the lower leaves are 2—5 mm. long. Open ground and in moist or dry woods, mostly in the Appalachian Mountains; Quebec to Georgia. June—July.

- 12a. One or both lemmas with awns; glumes similar in shape. . . . . 13  
12b. Lemmas without awns; first glume linear; second glume obovate, very broad. Fig. 189.

## WEDGEGRASS

*Sphenopholis obtusata* (Michx.) Scribn.



Figure 189

Perennial; tufted; culms 30—100 cm. tall; panicles dense and cylindrical, the branches spreading somewhat at flowering time. The peculiarly shaped glumes are the most characteristic thing about the wedgegrasses. In this species, the second glume is 2—2.5 times longer than its folded width. Open ground, thin woods, wet spots. Succulent and probably good feed, but not occurring in dense stands. May—August.

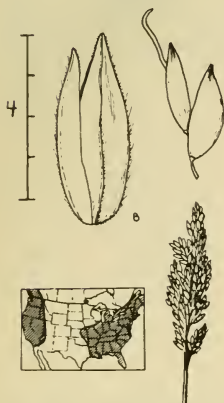
*Sphenopholis intermedia* Rydb. has a looser, more open panicle; the second glume is 3—4 times longer than the folded width. Throughout the United States and southern Canada. May—July.

*Sphenopholis nitida* (Biehler) Scribn. has a slender, open panicle. The upper lemma of each spikelet is visibly scabrous under a lens. Woods, eastern states to Illinois and Texas.

13a. Spikelets disarticulating in the pedicel, falling with the stub of the pedicel attached. . . . See Fig. 182 (*Trisetum pennsylvanicum*)

13b. Spikelets disarticulating just below the hairy glumes. Fig. 190.  
**VELVET GRASS**

*Holcus lanatus* L.



Perennial; tufted; culms 30—60 cm. tall; panicles elliptical, closely flowered. The spikelets have an awnless perfect lower floret and a staminate second floret with a short awn. The entire plant is softly velvety to the touch. Open moist ground, meadows, thickets. Velvet grass was imported for forage but is rarely cultivated now. The plant has been known to kill livestock under some conditions. Forage value low. Introduced from Europe. June—August.

Figure 190





TRIBE V. AGROSTIDEAE

- 1a. Spikelets disarticulating below the glumes and falling whole...2
- 1b. Spikelets disarticulating above the glumes, the floret falling.....8
- 2a. Glumes with awns or protruding midribs.....3
- 2b. Glumes without awns; midrib not protruding.....5
- 3a. Both glumes with single awns; floret smooth and shining.....4
- 3b. First glume with 2 or 3 awns; floret hairy. Fig. 191.  
 WOLFTAIL *Lycurus phleoides* H. B. K.

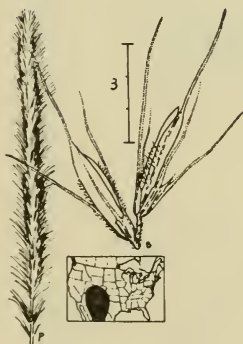


Figure 191

Perennial; tufted; culms 20—60 cm. tall. The dense, spikelike, bristly panicles are usually gray in color. The spikelets fall in pairs, one of each pair being on a longer stalk than the other. The lower spikelet is staminate and the upper one perfect. Open brushy hillsides and ponderosa pine forests, 1400—2600 m. elevation. A valuable forage grass, grazed especially in spring. July—September.

- 4a. Awn straight and stiff, shorter than the lemma.....25a

- 4b. Awn fine and delicate, about 3—4 times as long as the lemma; spikelets 2 mm. long. Fig. 192.

## RABBITFOOT GRASS

*Polypogon monspeliensis* (L.) Desf.



Figure 192

Annual; tufted; usually 15—50 cm. tall; panicles dense, often somewhat lobed, densely covered with soft, silky yellowish awns. Rabbitfoot grass is rather widely distributed in the United States, but is most common in the West, at low altitudes. Frequently found on seepy wet ground around springs or on banks of streams. Weedy; forage value low. May—October. Introduced from Europe.

- 5a. Panicle dense, cylindrical and spikelike.....6

- 5b. Panicle open, with spreading or drooping branches.....7

- 6a. Spikelets about 5 mm. long; panicles 7—10 mm. in diameter; awns protruding. Fig. 193.

## MEADOW FOXTAIL

*Alopecurus pratensis* L.

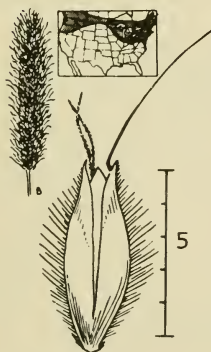


Figure 193

Perennial; tufted; culms 30—80 cm. tall. The panicles resemble those of timothy but the lemmas have protruding bent awns and the spikelets fall off at a touch when ripe. This genus is one of very few having united glumes. Meadow foxtail is sometimes cultivated as a forage grass in the northern states and found growing wild in meadows and waste ground. May—June. Introduced from Europe.

- 6b. Spikelets 2—3 mm. long; panicles 4—5 mm. in diameter; awns concealed in the glumes. Fig. 194.

*Alopecurus aequalis* Sobol.

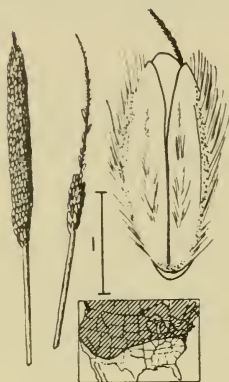


Figure 194

Perennial; culms weak and sprawling, 15—60 cm. long; leaf blades 1—4 mm. wide; panicles cylindrical, shattering very readily; 2—7 cm. long. The plants are frequent on wet ground in swamps or along small streams. Succulent and probably good forage. May—June.

- 7a. Glumes about  $\frac{1}{3}$  as long as the floret; cultivated annual; aquatic (Rice). See Fig 276. (*Oryza sativa*).

- 7b. Glumes about as long as the floret; wild plants, not aquatic. Fig. 195.

WOODREED

*Cinna arundinacea* L.

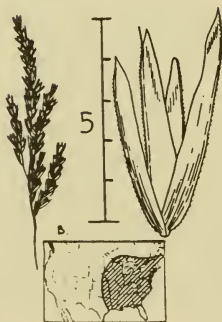


Figure 195

Perennial; culms in small tufts, 100—150 cm. tall; panicles large, 15—30 cm. long, drooping, the very flat spikelets shining, overlapping. The leaves are sometimes over 1 cm. wide. This common woodland grass is found in moist forests. August—October.

*Cinna latifolia* (Trevir.) Griseb. has smaller spikelets, less than 4 mm. long. Arctic America, southward through most of the United States except the southeastern states.

- 8a. Edges of leaf sheaths united. See Fig. 94 (*Melica imperfecta*).
- 8b. Edges of leaf sheaths overlapping, not united.....9
- 9a. Floret not dorsally compressed; awn present or absent.....10
- 9b. Floret dorsally compressed, the lemma and palea stiff, smooth and shining; awn absent. Fig. 196.

*Milium effusum* L.

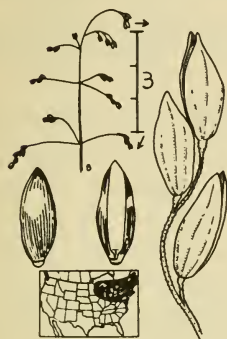


Figure 196

Perennial; culms in small tufts, up to 150 cm. tall. Foliage smooth, the leaf blades 8—15 mm. wide. The panicles are 10—20 cm. long, very open, cylindrical, with short drooping branches. The dorsally compressed floret greatly resembles that of species of *Panicum*, but the disarticulation above the glumes places it with the Agrostideae. Cool, moist woods. May—July.

- 10a. Floret hard, round in cross section, with faint nerves; awn usually present; callus pointed, hairy. Fig. 196 $\frac{1}{4}$  .....11



Figure 196 $\frac{1}{4}$

- 10b. Floret soft or leathery, usually more or less flattened and with evident nerves; callus not sharp pointed, either glabrous or hairy. Fig. 196 $\frac{1}{2}$ ....23



Figure 196 $\frac{1}{2}$

- 11a. Lemma with 3 awns, the lateral two often short..12

- 11b. Lemma with a single awn or none.....15

12a. Central awn spirally coiled at the base.....13

12b. Central awn not coiled.....14

13a. Glumes about equal in length; lateral awns about  $\frac{1}{4}$  as long as the central one. Fig. 197.

*Aristida dichotoma* Michx.



Figure 197

Annual; tufted, in small, shallowly-rooted clumps; culms 20—40 cm. tall. The panicles are very slender, almost racemose. The species of *Aristida* are sometimes called wiregrasses or needlegrasses. They are typically grasses of depleted ranges or poor, sterile soils. This species is found on dry sandy or rocky open ground or in open sterile woods. Forage value negligible. August—October.

13b. Glumes unequal, the first  $\frac{1}{2}$  to  $\frac{3}{4}$  as long as the second. Fig. 198.

*Aristida basiramea* Engelm.

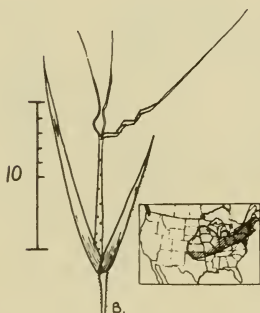


Figure 198

Annual; culms in small tufts, 30—50 cm. tall; leaf blades harsh, 1—2 mm. wide; panicles slender, raceme-like, 5—10 cm. long, at the tips of the culms and in axils of the upper leaf sheaths. Dry sterile soil, open ground. August—October.

Var. *curtissii* (Gray) Shinnars has very short lateral awns, 2—4 mm. long. Pennsylvania and Virginia to Wisconsin, Wyoming, Colorado and Arkansas.



- 14a. Glumes about equal, 2—3 cm. long; lemma about 2 cm. long.  
Fig. 199.

*Aristida oligantha* Michx.

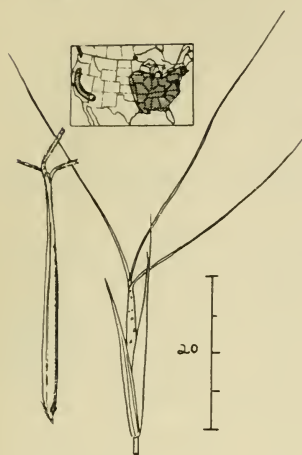


Figure 199

Annual; tufted; culms much branched, 30—50 cm. tall; leaf blades narrow, usually under 1 mm. wide; panicles 10—20 cm. long; glumes nearly equal, 2—3 cm. long, sometimes 3-cleft at the tip; awns 4—7 cm. long, spreading, about equal in length. The plants are wiry and almost leafless, most of the height being the bristly inflorescences. The sharp-pointed, 3-awned florets of this and other species of *Aristida* are great "crawlers." The pointed and backwardly-barbed calus penetrates hair or clothing easily, and every movement of the body of the host results in the floret digging in deeper, aided by the scabrous awns. Forage value negligible. Dry open ground. August—October.

- 14b. Glumes unequal, the first about 1 cm. long, the second twice as long; lemma 12—15 mm. long. Fig. 200.  
**DOGTOWN GRASS**

*Aristida longiseta* Steud.

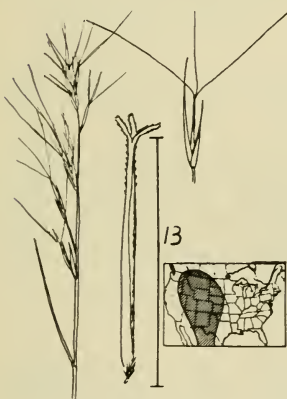


Figure 200

Perennial; in large tufts; culms 20—50 cm. tall; panicles narrow, standing well above the leaves, appearing as a feathery mass of long, reddish awns. The awns may reach lengths of 6—8 cm. The narrow, stiff, straight leaves may be mostly at the base of the plant. Dogtown grass is an inferior forage species. The sharp awns and pointed calus cause the florets to pierce the facial tissues of grazing animals, causing serious infections and sometimes blindness. Dry plains and foothills, especially on thin rocky soil or bare ground. July—October.

*Aristida fendleriana* Steud. is similar in the panicle and spikelets, but most of the leaves are crowded in dense, curly basal tufts. Widespread in the Great Plains and western mountain states.

- 15a. Awn bent, twisted at least near the base, firmly attached to the lemma ..... 18

15b. Awn straight or bent, (rarely absent) readily separating from the lemma when mature; floret rather short and plump.....16

16a. Lemmas covered with short, appressed hairs or glabrous.....17

16b. Lemmas covered with long, silky white hairs; panicle open, with spreading branches. Fig. 201.

INDIAN RICEGRASS *Oryzopsis hymenoides* (R. & S.) Ricker

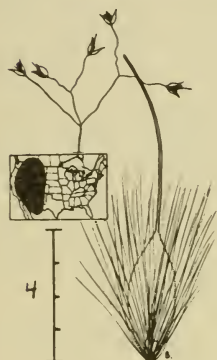


Figure 201

Perennial; culms 30—60 cm. tall, in dense, tough tufts. The panicles are very open, with scattered spikelets on the tips of slender, zig-zag pedicels. The lemmas are brownish-black, but are covered with a dense cloud of white hairs. The awns readily break away from the lemmas, and may be missing from many of the spikelets. This is one of the most valuable forage grasses in the desert areas of the West. It is especially prized for winter feed. The large seeds are nutritious feed for livestock and formerly were used as food by the Zuñi Indians. April—August.

17a. Spikelets (without the awns) 6—9 mm. long; leaf blades flat, all at the base of the plant. Fig. 202.

*Oryzopsis asperifolia* Michx.



Figure 202

Perennial; tufted, with numerous long flat basal leaves; culms 20—70 cm. long, usually spreading, lacking leaf blades (sheaths present). The hard cylindrical lemmas are yellowish in color. Scattered in sandy or rocky woods. May—June.

*Oryzopsis racemosa* (Smith) Ricker is similar in general habit, but has long upper culm leaves and short basal leaves. The lemmas are black. Quebec to Delaware, westward to Kentucky and South Dakota. June—August.

- 17b. Spikelets (without the awn) less than 3 mm. long; leaves thread-like; some leaf blades on the culms. Fig. 203.

*Oryzopsis micrantha* (Trin. & Rupr.) Thurb.



Figure 203

Perennial; in dense tufts; culms thin, 30—70 cm. tall; leaf blades flat or rolled, less than 2 mm. wide, scabrous; panicles 10—15 cm. long, with slender spreading branches, the spikelets borne near the tips; glumes thin and translucent; lemmas smooth or with appressed hairs, yellow or brownish; awns readily detachable, straight, 5—10 mm. long. Open woods and dry rocky slopes, intermediate elevations. The plants are said to have some forage value. June—July.

*Oryzopsis miliacea* (L.) Benth. (SMILO GRASS) has similar spikelets but broad, flat leaf blades, 8—10 mm. wide. It is cultivated for forage in California. Introduced from Europe

- 18a. Lemma 5—12 mm. long, excluding the awn.....19

- 18b. Lemma 15—25 mm. long. Fig. 204.

**PORCUPINE GRASS**

*Stipa spartea* Trin.

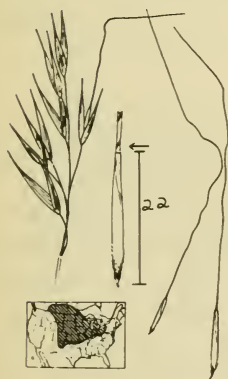


Figure 204

Perennial; culms in small hard tufts, about 1 m. tall. The panicle is erect or nodding, with few spikelets; glumes whitish; mature lemmas brown; awns 15—20 cm. long, with one or two sharp bends. The floret of *Stipa* species is a remarkable self-planting device. When it falls from the glumes, its sharp pointed callus readily penetrates the ground. The backward-pointing hairs prevent the floret from pulling out. The twisted portion of the awn coils and uncoils as the moisture content of the air changes, causing the bent arm of the awn to revolve slowly until it comes in contact with grass stems or other objects. Then the whole lemma is literally screwed down into the earth. Unfortunately

the same process will occur if the florets get into wool or hair of animals, and these florets can thus cause serious puncture wounds on grazing animals, especially around the eyes, nose, and mouth. Prairies and dry open ground, mostly in the Midwest. June—July.

## HOW TO KNOW THE GRASSES

- 19a. Lemma 8—12 mm. long; glumes 12—20 mm. long.....20  
 19b. Lemma 5—6 mm. long; glumes 5—10 mm. long.....22  
 20a. Lemma without a smooth whitish summit.....21  
 20b. Lemma with a smooth whitish ring at the summit. Fig. 205.  
**TEXAS NEEDLEGRASS** *Stipa leucotricha* Trin. & Rupr.

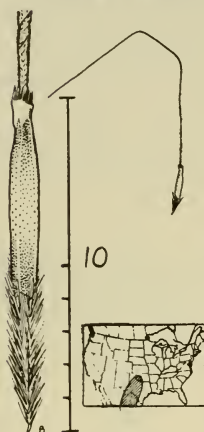


Figure 205

Perennial; culms 30—60 cm. tall; leaf blades 10—30 cm. long, very narrow, rolled, rough to the touch, dark green. The awn is 6—10 cm. long, with two bends. The lower sheaths contain very peculiar hidden spikelets (cleistogamous), lacking glumes and with a very short-awned lemma. This species begins growth very early, in late winter and early spring and is prized for winter feed. The awned florets may injure sheep. Dry plains. May—June.

- 21a. Mature lemma chocolate brown or black.....22  
 21b. Mature lemma pale or brownish. Fig. 206.  
**NEEDLE AND THREAD** *Stipa comata* Trin. & Rupr.

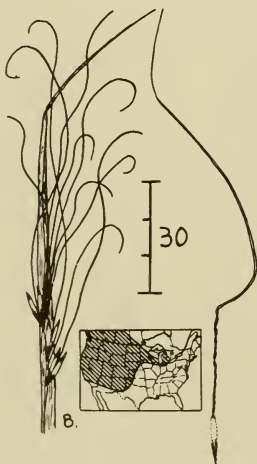


Figure 206

Perennial; culms in tufts, 30—60 cm. tall. The panicle is a mass of curly awns, 10—15 cm. long. The base of the panicle is usually partially hidden in the uppermost sheath. Needle and thread is a valuable forage grass in many parts of the West. It is grazed especially in the spring and fall, before the "needles" are formed and after they fall. Prairies, plains, and dry open mountain slopes. June—August.



- 22a. Edges of lemma overlapping and hiding the palea; panicle elongated, spikelike, with many spikelets. Fig. 207.

*Stipa viridula* Trin.

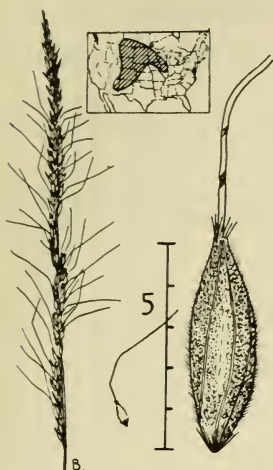


Figure 207

Perennial; culms 60—100 cm. tall, in dense clumps; panicles slender, dense, elongated, 10—20 cm. long. The glumes are glossy and rather translucent. Awn 2—3 cm. long, with two bends. Dry plains. This species yields good forage. June—August.

*Stipa robusta* Scribn. (SLEEPY GRASS) is very similar, but taller (100—150 cm). It has a narcotic effect on horses who graze it. Dry plains, Colorado to Texas and Arizona.

- 22b. Edges of lemma not meeting, turned inward, with a deep groove between the edges; panicle with spreading branches, bearing a few spikelets near their tips. Fig. 208.

PINYON RICEGRASS *Piptochaetium fimbriatum* (H. B. K.) Hitch.

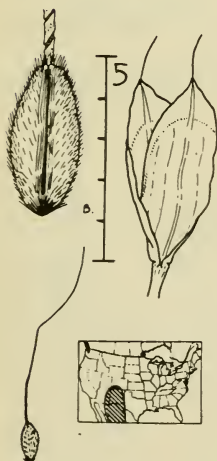


Figure 208

Perennial; culms in dense tufts, 40—80 cm. tall; leaf blades one-third to one-half as long as the culms, mostly at the base of the plant, thread-like and curved downward; panicles 5—15 cm. long; glumes about 5 mm. long, thin; floret dark-colored, glabrous or hairy; awns readily detachable, twice bent, 1—2 cm. long. Piñon ricegrass is said to be a valuable forage species. Open, rocky woods.

The genus *Piptochaetium* is one of the oldest known grass genera. Fossils of the florets have been collected from Miocene rock formations in the western states.



- 23a. One or both glumes longer than the lemma (excluding the awn) .....24
- 23b. Glumes shorter than or equal to the lemma in length.....39
- 24a. Glumes both longer than the lemma, equal, strongly flattened and keeled, V-shaped in cross section.....25
- 24b. Glumes either unequal or not strongly keeled, never with long fringing hairs on the keel.....26
- 25a. Spikelets about 5 mm. long; glumes cut square at the tip, the mid-nerve protruding as an awn; plants widespreading, tufted. Fig. 209.

## TIMOTHY

*Phleum pratense* L.

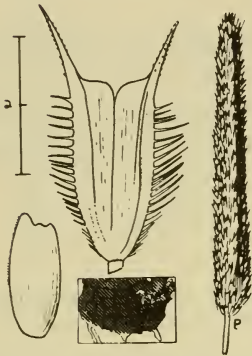


Figure 209

Perennial; tufted, the culms 50—100 cm. tall, often with swollen, bulb-like bases. The dense, cylindrical panicles are stiff and somewhat bristly. Timothy is one of the important hay meadow grasses in the northern states, and is very widely established in the wild as well, in the moister portions of the country. June—July.

*Phleum alpinum* L. (ALPINE TIMOTHY), with short, plump, dark colored panicles, occurs in wet mountain meadows at high altitudes in the West and from Greenland to Alaska.

- 25b. Spikelets 10—20 mm. long; coarse, stiff grasses of sand beaches; rhizomes long and stiff. Fig. 210.

## AMERICAN BEACHGRASS *Ammophila breviligulata* Fernald

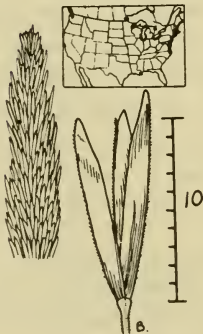


Figure 210

Perennial; spreading by very long, stiff rhizomes. The plants are coarse and tough. Panicles dense and cylindrical, 10—20 cm. long. The plants are highly important sand binders on dunes along the Atlantic Coast and on sand beaches of the Great Lakes. July—September.

- 26a. Glumes not swollen near the base.....27

## 26b. Glumes swollen near the base. Fig. 211.

### NIT GRASS

*Gastridium ventricosum* (Gouan) S. & T.

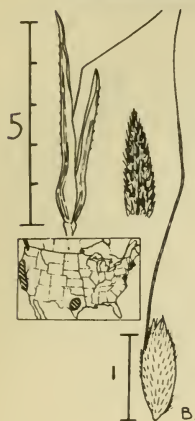


Figure 211

Annual; tufted, shallow-rooted; culms 20—55 cm. tall; panicles dense, cigar-shaped, with glossy silvery or yellowish spikelets. The minute floret is concealed by the glumes. Weed of fields and waste places, common on the Pacific Coast. Introduced from Europe. May—July.



Figure 212

## 27a. Rachilla prolonged as a short hairy bristle behind the palea (CARE). Fig. 212.....28

## 27b. Rachilla not prolonged behind the palea.....30

## 28a. Awn straight, hidden within the glumes; hairs nearly as long as the lemma .....29

## 28b. Awn bent sidewise, protruding from the glumes; hairs shorter than the lemma. Fig. 213.

### PINEGRASS

*Calamagrostis rubescens* Buckl.



Figure 213

Perennial; culms in tufts, 60—100 cm. tall; plants producing rhizomes; leaf blades scabrous, 2—4 mm. wide, flat or somewhat rolled; panicles dense and cylindrical, 7—15 cm. long, pale or purplish in color; glumes 4—5 mm. long; sterile rachilla joint about 1 mm. long, its hairs about twice as long. While common, pinegrass is low in palatability, especially for sheep, and is little grazed except when young and green. The plants make a strong, tough turf which resists heavy grazing and trampling. Most of the reproduction is by rhizomes. Coniferous forests, up to 3300 m. elevation. June—August.

# HOW TO KNOW THE GRASSES

- 29a. Panicle open, pyramidal, with spreading or drooping elongated branches. Fig. 214.

## BLUEJOINT

*Calamagrostis canadensis* (Michx.) Beauv.

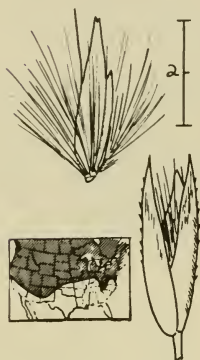


Figure 214

Perennial; culms slender, in small tufts, 60—150 cm. tall; plants producing many, long, creeping rhizomes. The panicles vary from rather dense to loose, pyramidal, and nodding. Bluejoint is a very widespread and common species found in marshes and wet ground. While rather tough, it furnishes a good deal of forage and is sometimes cut for marsh hay in the North Central States. June—August.

- 29b. Panicle dense, cylindrical, with short, erect branches. Fig. 215.

*Calamagrostis inexpansa* Gray



Figure 215

Perennial; culms in tufts, 40—120 cm. tall; plants producing rhizomes. The dense, cylindrical panicle may be pale or purplish. The leaf blades are rough to the touch and usually rolled; ligules 4—7 mm. long. Marshes and wet meadows, apparently sometimes on dry soil in the western mountains. June—July.

- 30a. Glumes unequal, the first shorter than the floret, the second longer .....31

- 30b. Glumes equal, both longer than the floret; palea shorter than the lemma; tufted or rhizome-bearing plants.....32

- 31a. Lemma without long hairs on the callus; glabrous or with appressed hairs on the back.....55

- 31b. Lemma bearing a copious tuft of white hairs attached to the callus; tall perennial with stout rhizomes. Fig. 216.  
**SAND REEDGRASS** *Calamovilfa longifolia* (Hook.) Scribn.

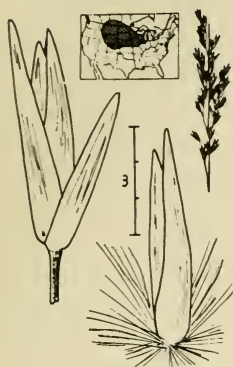


Figure 216

Perennial; culms 50—180 cm. tall, in small tufts; plants producing long, tough, scaly rhizomes; panicles large, 15—35 cm. long; lemmas bearing copious tufts of straight white hairs on the callus. The plants are coarse and tough, but make considerable amounts of winter feed and are sometimes cut for hay. Sandy soil, hills and plains; shores of Lake Huron and Lake Michigan. August—September.

*Calamovilfa gigantea* (Nutt.) Scribn. & Merr. is similar but larger, and has hairs on the backs of the lemmas. Sand dunes of the great plains and southwestern states.

- 32a. Glumes with long awn-tips, or the lemmas long-awned from the tip; panicles dense; rhizomes densely covered with overlapping scales .....42
- 32b. Glumes not awned; lemmas awnless or awned from the back; panicles open or dense; rhizomes, if present, not covered with overlapping scales .....33
- 33a. Palea at least half as long as the lemma; plants often with rhizomes or stolons .....34
- 33b. Palea absent or less than  $\frac{1}{4}$  as long as the lemma; plants tufted, lacking rhizomes or stolons.....36
- 34a. Plants with erect stems; panicles open, pyramidal.....35



- 34b. Plants with creeping stolons, rooting at the nodes and forming flat mats; rhizomes absent; panicle narrow, the branches closing up after the flowering period. Fig. 217.

## CREeping BENT

*Agrostis palustris* Huds.



Figure 217

Perennial; low, spreading by numerous fine leafy stolons. This species is much used for golf greens and fine lawns, but requires frequent cutting and watering to produce a good turf, and the plants are subject to several serious diseases. New lawns are usually produced by planting pieces of chopped turf, which take root and spread to form a continuous sod. Reproduction by seed is also possible, but seed of many strains is very scarce or unobtainable. Various forms of this species are known as seaside bent, Coos Bay bent, Washington bent, and Metropolitan bent. Marshes, especially along seacoasts, wet ground around streams, springs, lakes, and ditches. Also known from Europe and Asia. June—September.

- 35a. Ligules 1—2 mm. long; leaf blades 1—3 mm. wide. Fig. 218.

## BROWNTOp

*Agrostis tenuis* Sibth.



Figure 218

Perennial; plants 20—40 cm. tall; rhizomes absent but short stolons sometimes present; leaf blades very narrow; ligules on sterile shoots about 1 mm. long, on the culms up to 2 mm. long; panicles usually 5—10 cm. long, brownish, open and delicate, the spikelets all near the outer tips of the branches. *Agrostis tenuis* is cultivated as a lawn and pasture grass and is sometimes referred to as Rhode Island bent, Prince Edward Island bent, Colonial bent, New Zealand bent, or Astoria bent. The plants are occasionally found growing wild in regions where brown-top is cultivated. Some forms possess lemmas which bear a delicate awn attached near the base. Introduced from Europe. June—July.



35b. Ligules 3—7 mm. long; leaf blades 2—6 mm. wide. Fig. 219.

## REDTOP

*Agrostis alba* L.



Figure 219

Perennial; culms up to 1—1.5 m. tall; numerous creeping rhizomes present; panicle pyramidal, with rather dense whorls of branches, flowering to their bases. Redtop is one of our most important meadow grasses, and is also used in lawn seed mixtures. Roadsides, meadows, waste ground; very widely naturalized. June—August. Introduced from Europe.

36a. Panicle narrow, with the short branches bearing spikelets nearly to their bases .....37

36b. Panicle open, the spreading branches bearing spikelets at their outer ends only .....38

37a. Slender alpine plants; leaf blades 5 cm. long or shorter, 1—2 mm. wide; ligules 1—2 mm. long; panicles usually less than 5 mm. wide. Fig. 220.

*Agrostis variabilis* Rydb.

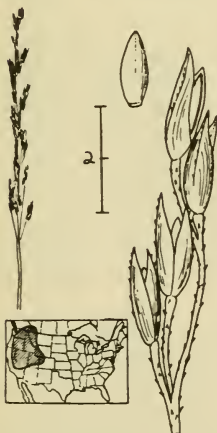


Figure 220

Perennial; tufted; culms 10—20 cm. tall; panicles small, 2—6 cm. long; spikelets about 2.5 mm. long; lemmas about 1.5 mm. long; palea very short. High altitudes in the mountains, usually above timberline along creeks and on slopes. Forage value good. July—August.

*Agrostis humilis* Vasey. Similar but smaller, differing from the above chiefly in having a palea about 2/3 as long as the lemma; plants 5—15 cm. tall; panicles purple, slender, 1—3 cm. long. Excellent forage. Bogs and mountain meadows above timberline, Montana and Washington to Colorado and Nevada. July—August.

- 37b. Stouter plants of medium and low altitudes; longer leaf blades 8—10 cm. long; ligules 3—6 mm. long; panicles usually 1—several cm. wide. Fig. 221.

**SPIKE REDTOP**

*Agrostis exarata* Trin.

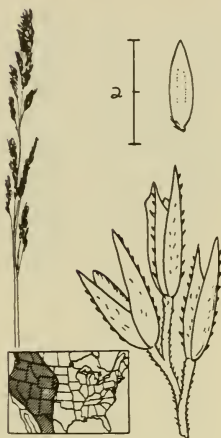


Figure 221

Perennial; tufted; culms 20—120 cm. tall; panicles spikelike, either thin or thicker and somewhat lobed. Lemma sometimes awned. This is one of the most important western range grasses. It is palatable to both domestic livestock and wild grazing animals. Usually on moist ground, in meadows, along streams, and in open woodlands. July—August.

- 38a. Panicles with long, slender main branches which branch again only on the outer half. Fig. 222.

**TICKLEGRASS**

*Agrostis scabra* Willd.

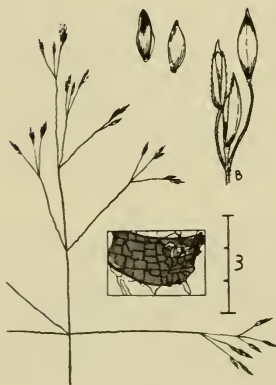


Figure 222

Perennial; culms slender, 20—80 cm. tall; leaf blades threadlike, in dense tufts at the base of the culms; panicles delicate, readily breaking away from the plants and blown by the wind as tumbleweeds. Forage value fair. Ticklegrass is a very widespread species, on open ground or in partial shade, especially on moist soil. June—September.

*Agrostis hyemalis* (Walt.) B. S. P. is similar but has spikelets bunched at the tips of the branches. It blooms earlier, in May and early June. Atlantic coastal plain and lower Mississippi Valley.

- 38b. Main panicle branches branching again below the middle. Fig. 223.  
*Agrostis perennans* (Walt.) Tuck.



Figure 223

Perennial; tufted; culms 20—80 cm. tall; panicles usually delicate and lace-like, especially in shade-grown plants. Lemmas rarely awned. Dry open fields and woodlands. July—October.

*Agrostis oregonensis* Vasey is similar, but larger and more vigorous. Marshes; Montana to British Columbia, southward to Wyoming and California.

- 39a. Glumes minute, less than  $1/5$  as long as the lemma.....40  
 39b. Glumes half as long as the lemma or longer.....41  
 40a. Rachilla extending beyond the palea of the floret as a bristle; erect, broad-leaved forest grass. Fig. 224.

*Brachyelytrum erectum* (Schreb.) Beauv.



Figure 224

Perennial; tufted; culms 60—100 cm. tall; leaf blades 10—15 mm. wide, flat, rather light green; leaf sheaths and blades usually hairy; panicles slender, 5—15 cm. long, with erect branches; first glume nearly absent; second glume up to 2 mm. long; floret cylindrical, firm, about 1 cm. long, with an awn 1—2 cm. long. Typical *B. erectum* is found mostly south of the glaciated areas of the eastern United States. The lemmas have stout, stiff hairs along the nerves and are otherwise glabrous. It grows in scattered stands in upland woods. June—July.

Var. *septentrionale* Babel grows mostly north of the glacial boundary, or southward in the mountains. The lemmas are sparsely and uniformly covered with minute appressed hairs or are nearly glabrous. Moist thickets and swampy woods. Also known from Japan.

# HOW TO KNOW THE GRASSES

- 40b. Rachilla not prolonged; weak, sprawling weedy grass of disturbed soil, lawns, etc. Fig. 225.

## NIMBLE WILL

## *Muhlenbergia schreberi* Gmel.

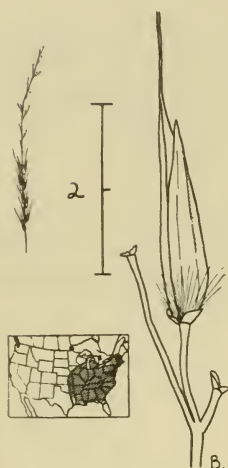


Figure 225

Perennial. The culms in early season are quite erect, but by flowering time they become much-branched and sprawl on the ground, the lower nodes often rooting. The erect portions of the culms are 10—30 cm. long. Leaf blades usually 2—4 mm. wide; foliage glabrous; panicles borne at the tips of the culms and from leaf axils, slender and weak, 5—15 cm. long. The glumes are vanishingly small, the first sometimes entirely lacking and the second only a few tenths of a millimeter long. Florets cylindrical, about 2 mm. long, hairy on the callus; awn 2—5 mm. long, very slender. Nimble Will may become a weed in shaded lawns and shrubbery borders, but it does not seem very aggressive. It also is found growing in woods and thickets, roadsides and city streets, old fields, and meadows. August—October, rarely blooming in June or July.

- 41a. Lemma bearing an awn; nerves of lemma 3 or 5.....42
- 41b. Lemma awnless; nerves 1, 3, or 5.....51
- 42a. Plants producing elongated rhizomes.....43
- 42b. Plants lacking rhizomes (old tufts sometimes stooling out).....47
- 43a. Panicles slender, with short ascending branches; spikelets awned or awnless, on short pedicels.....44

- 43b. Panicles open, with spreading branches; tiny awnless spikelets on long slender pedicels. Fig. 226.

**SCRATCHGRASS** *Muhlenbergia asperifolia* (N. & M.) Parodi.

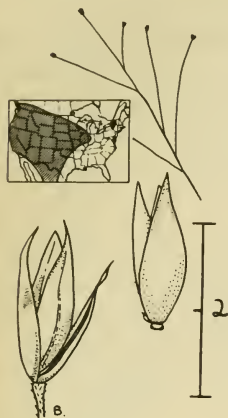


Figure 226

Perennial; bushy, 10—50 cm. tall, with rhizomes; panicles open, dome-like, 5—15 cm. long; plants pale green in color; leaf blades 2—5 cm. long, 1—2 mm. wide; ligules minute. The grains are often swollen up into spherical shape by the action of a fungus. Moist, often alkaline soil. June—September.

*Muhlenbergia arenacea* Buckl. is similar but has prominent ligules, 1—2 mm. long. Texas to Colorado and Mexico.

- 44a. Leaf blades 3 mm. wide or wider, more than 5 cm. long, flat; lemmas awned or awnless.....45

- 44b. Leaf blades 1—2 mm. wide, less than 5 cm. long, usually rolled; lemmas awnless. Fig. 227.

**MAT MUHLY** *Muhlenbergia richardsonis* (Trin.) Rydb.



Figure 227

Perennial; much-branched, spreading by hard, thin rhizomes and forming mats, the erect portions of the culms 5—60 cm. long; panicle slender, 2—10 cm. long. Mat muhly is a grass of open, often wet or alkaline soil. While rather tough, it furnishes fairly good livestock feed. The densely matted plants furnish considerable erosion protection to the soil. July—September. Also known as *M. squarrosa* (Trin.) Rydb.

- 45a. Glumes not longer than the lemma, less than 3.5 mm. long....46



- 45b. Glumes much longer than the lemma, tapering to awn tips. Fig. 228.

*Muhlenbergia glomerata* (Willd.) Trin.

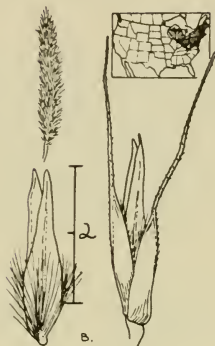


Figure 228

Perennial; culms in tufts, 30—90 cm. tall, with slender creeping rhizomes; panicles dense, cylindrical, and somewhat lobed, often purplish in color, 3—10 cm. long; anthers 1—1.5 mm. long. Moist or rocky ground. July—October.

*Muhlenbergia racemosa* (Michx.) B.S.P. is similar, but has small anthers less than 1 mm. long. Prairies, wet or rocky ground, Manitoba and Indiana to Alberta and Washington.

- 46a. Culms much-branched, with numerous small panicles in the axils of the leaf sheaths; stems smooth and shining. Fig. 229.

*Muhlenbergia frondosa* (Poir.) Fern.



Figure 229

Perennial; rhizomes present; culms becoming elongated, 40—100 cm. or more long, the plants becoming bushy and much-branched, frequently scrambling through bushes or other vegetation or sprawling; panicles at the tips of the culms and protruding from nearly every leaf sheath, up to 10 cm. long, rather dense; leaf blades flat, scabrous, 3—7 mm. wide; glumes 2—4 mm. long, tapering gradually from base to an awned tip; lemmas 2—3 mm. long, awnless or awned. This is a very common species in thickets and woods and on roadsides and stream banks. August—October.

*Muhlenbergia sobolifera* (Muhl.) Trin. is somewhat similar, but the glumes curve abruptly to awn tips from a point above the middle. The culms are erect and sparingly branched. Lemmas awnless. Dry woods. New Hampshire to Virginia, westward to Nebraska and Texas. July—October.

- 46b. Culms not much branched; panicles all at the tips of long protruding branches or the main culms; stems dull, roughened with minute hairs, especially below the joints. Fig. 230.

*Muhlenbergia sylvatica* Torr.



Figure 230

Perennial; culms 40—100 cm. tall; rhizomes present; plants often bushy; leaf blades flat, soft, 2—8 mm. wide; panicles narrow, arching, with thin, erect branches; some of the spikelets on pedicels as long as the glumes; glumes tapering to awn points, 2—3 mm. long; lemma slightly longer, hairy on the callus and lower portion, with an awn 5—10 mm. long. The culms feel file-like when scratched with the finger nail, especially below the nodes. Forms with short awns or none are known. Woods, meadows, thickets, and roadsides. August—September.

*Muhlenbergia mexicana* (L.) Trin. is similar but has denser, usually lobed panicles, most of the spikelets being nearly sessile on the branches; lemmas awnless; leaf blades 2—4 mm. wide. Rocky shores, moist woods, swamps. Throughout most of the United States except Texas and the southeastern states.

- 47a. Second glume not toothed.....48

- 47b. Second glume 3-toothed near the tip. Fig. 231.

*Muhlenbergia montana* (Nutt.) Hitch.



Figure 231

Perennial; culms in large, dense tufts, 30—60 cm. tall; panicles slender, with ascending branches. The 3-toothed second glume is the best identifying mark of this species. The old sheaths at the base of the plants become flat and stiff, like thin wooden splints. This species yields fairly palatable forage, especially when the herbage is young. Ponderosa pine, spruce, and fir forests, 2300—3300 m. elevation. July—October.

## HOW TO KNOW THE GRASSES

48a. Panicle very narrow, the short branches bearing spikelets nearly to their bases .....49

48b. Panicle broad, open, the spikelets borne near the tips of the branches .....50

49a. Awn shorter than the lemma or lacking. Fig. 232.

*Muhlenbergia cuspidata* (Torr.) Rydb.

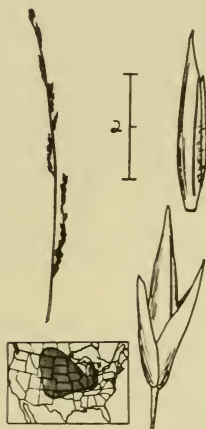


Figure 232

Perennial; tufted; culms slender and wiry, 20—40 cm. tall; ligules minute; panicles very slender. Dry hills and prairies. July—September.

*Muhlenbergia wrightii* Vasey (SPIKE MUHLY) is similar but has a denser panicle, somewhat like timothy. The ligule is 1—2 mm. long. It is an important grazing grass on open or bushy ranges, ponderosa pine forests, from southern Colorado and Utah southward.

49b. Awn 1—several times as long as the lemma. Fig. 233.

**BULLGRASS**

*Muhlenbergia emersleyi* Vasey



Figure 233

Perennial; in large tufts; culms tall and stout, 50—100 cm. tall; sheaths glabrous, flattened and keeled; lower leaf blades up to 50 cm. long; blades flat or folded, rough, 1—4 mm. wide; ligules thin, 1—2 cm. long; panicles long and narrow, 20—40 cm. long, with ascending, overlapping branches; spikelets often somewhat purplish; glumes scabrous; lemmas hairy on the lower half, awnless or with an awn up to 25 mm. long attached below the apex. Some panicles may have both awned and awnless spikelets. Canyons and rocky woods; said to be a good soil binder. September—October.

## HOW TO KNOW THE GRASSES

50a. Plants forming sprawling, much-branched bushes from knotty crowns. Fig. 234.

**BUSH MUHLY**

*Muhlenbergia porteri* Scribn.

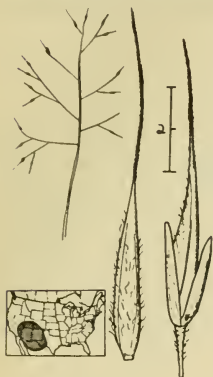


Figure 234

Perennial; the much-branched plants will form bushy growth a meter in diameter and height if ungrazed. Because of the very high palatability of this species for grazing livestock, it is rarely seen except in the hearts of spiny bushes. The plants are semi-evergreen, the old culm bases producing new shoots in the succeeding year. Dry plains and deserts. July—September.

50b. Stems erect, usually unbranched. Fig. 235.

**RINGGRASS**

*Muhlenbergia torreyi* (Kunth) Hitch.

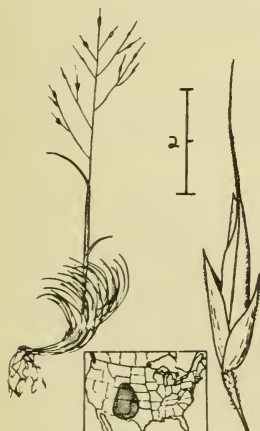


Figure 235

Perennial; plants forming circular or ring-shaped tufts, with numerous short, curly leaves, mostly clustered at the base of the plant. Ringgrass is a rather poor forage grass. Its presence usually indicates that better species have been killed out. Open plains, 1300—3300 m. elevation. July—August.

51a. Floret bearing a tuft of hairs on the callus; panicles large and open. Fig. 236..genus *CALAMOVILFA*, see Fig. 216.

51b. Floret without conspicuous hairs on the callus (sometimes hairy on the nerves).....52



Figure 236



## HOW TO KNOW THE GRASSES

52a. Nerves of the lemma without silky hairs. . . . .53

52b. Lemma 3-nerved, the nerves densely covered with short silky hairs. Fig. 237.

### PINE DROPSEED

*Blepharoneuron tricholepis* (Torr.) Nash



Figure 237

Perennial; tufted; culms slender, almost leafless, 20—60 cm. tall. The leaf blades are crowded in a basal tuft about a third as long as the culms. The panicles are loosely cylindrical, somewhat grayish in color. This species is a good forage grass, especially in early season. Open parks and thin woods, ponderosa pine, spruce, and fir forests. July—October.

53a. Lemmas with 3—5 nerves, awned or awnless; grain remaining inclosed by the lemma and palea; ovary wall not separable from the seed. . . . .go back to 42

53b. Lemmas with one nerve, awnless; grain falling free of the lemma and palea at maturity; ovary wall when wet usually swelling into a jelly-like material which can be peeled from the seed. . .54

54a. Glumes plainly unequal in length. . . . .55

54b. Glumes equal in length, nearly as long as the floret; plants annual, in small tufts with very shallow roots. Fig. 238.

*Sporobolus vaginaeflorus* (Torr.) Wood



Figure 238

Annual; culms thin, wiry, 10—40 cm. tall, in small tufts; panicles mostly concealed within the upper leaf sheaths, or only the tips protruding. The lemmas are usually blackish-spotted, and the palea is often longer than the lemma. Both lemma and palea are covered sparsely with appressed hairs. Dry sterile open ground. August—October.

*Sporobolus neglectus* Nash is similar, but has shorter, plumper spikelets with glabrous lemmas. Northeastern and midwestern United States.



- 55a. Spikelets 4—7 mm. long.....56
- 55b. Spikelets 1—2.5 mm. long.....57

56a. Panicle open, with spreading branches. Fig. 239.

## PRAIRIE DROPSEED

*Sporobolus heterolepis* Gray

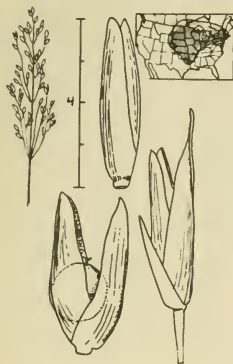


Figure 239

Perennial; plants forming large tufts; culms 30—70 cm. tall; panicles narrowly ovoid. The spikelets become much distended by the ripening grain, which is spherical and yellowish at maturity and about 2 mm. in diameter. The palea readily splits down the middle as the grain develops. Prairies. July—October.

56b. Panicle spikelike, mostly hidden in the uppermost sheath. Fig. 240.

*Sporobolus asper* (Michx.) Kunth

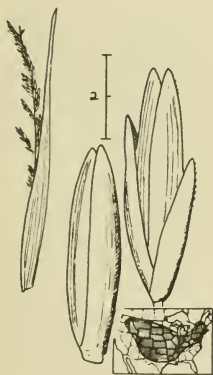


Figure 240

Perennial; tufted; culms 60—120 cm. tall; leaf blades flat or rolled, 1—4 mm. wide, tapering to a slender tip; panicles whitish or somewhat purplish in color, 5—15 cm. long. Open ground and prairies. August—September.

*Sporobolus macer* (Trin.) Hitch. is very similar, but has scaly rhizomes. Pine forests; Mississippi to Oklahoma and eastern Texas.

*Sporobolus clandestinus* (Biehler) Hitch. is similar, but has hairy florets; lemma and palea slender-pointed, the palea longer than the lemma. Dry sandy lands; Connecticut to Wisconsin, Kansas, Texas and Florida.

57a. Sheaths glabrous or nearly so at the summit.....58

- 57b. Sheaths bearing conspicuous tufts of white hairs at their summits.  
Fig. 241.

## SAND DROPSEED

*Sporobolus cryptandrus* (Torr.) Gray

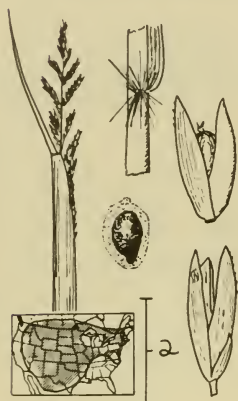


Figure 241

Perennial; tufted, the erect or spreading culms 30—100 cm. long; panicles borne at the apex of the culms and in the axils of the upper sheaths. The tufts of straight silky hairs on the flanges at the summits of the sheaths are prominent. Sand dropseed is a rather important forage species on coarse or sandy soil in the West. It produces an abundance of fine, long-lived seed, and will recover rapidly from the effects of overgrazing. July—October.

*Sporobolus giganteus* Nash (GIANT DROPSEED) resembles the above, but may be distinguished by its large size, from 1—2 m. tall, and slightly larger spikelets, 2.5—3 mm. long. Sand plains, western Oklahoma and Texas to Colorado and Arizona.

- 58a. Panicle not more than twice as long as wide; leaf blades usually rolled. Fig. 242.

## ALKALI SACATON

*Sporobolus airoides* Torr.

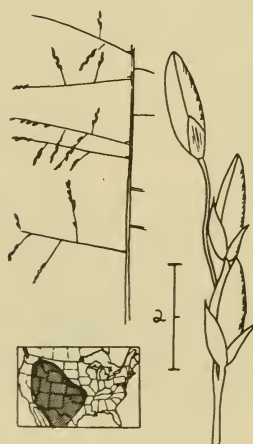


Figure 242

Perennial; culms tough and rigid, in large clumps; plants 50—100 cm. tall. The large, open, dome-shaped panicles make up half or more of the height of the plant. The paleas of the florets often split as the grain develops. The plants can grow on very salty or alkaline soil. Although the herbage is tough, it is taken greedily by livestock, probably because of the large amount of salt in the tissues. Frequently, minute salt crystals can be seen glistening on the leaf surfaces with a hand lens. Plains and alkali flats, often on heavy clay soils. June—September.

- 58b. Panicle three or more times longer than wide; leaf blades usually flat. Fig. 243.

## SACATON

*Sporobolus wrightii* Munro

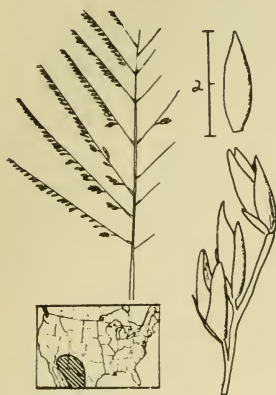


Figure 243

Perennial; culms in large tufts, stout and tough, 1—2.5 m. tall; panicles up to 60 cm. long, the branches bearing spikelets nearly to their bases. The plants furnish good grazing when young, and are sometimes cut for hay. River flats, especially where overflows occur. July—September.

## TRIBE VI. ZOYSIEAE

- 1a. Spikelets inclosed in spiny burs, the spines hooked at the tips. Fig. 244.

### COCKLEBUR GRASS

*Tragus berteronianus* Schult.

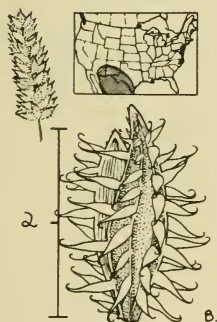


Figure 244

Annual; culms 10—40 cm. long, spreading. The burs are borne along a slender raceme, from which they fall readily. Each bur consists of a group of 2—5 spikelets, but the second glumes of the two lower spikelets are covered with hooked prickles and conceal the remainder. The plants occur on dry open ground in the Southwest and also at scattered points on the east coast where wool is processed. The burs are readily transported by the wool of sheep. Probably introduced from the old world; extending through the warmer portions of both hemispheres. August—October.

- 1b. Spikelets not inclosed in spiny burs.....2  
2a. Spikelets falling in groups of 3, all without stalks.....3  
2b. Spikelets falling in pairs, each spikelet on a short stalk.....  
genus *Lycurus*. Fig. 191.

- 3a. Plants spreading by slender creeping stolons; culms 10—30 cm. tall.  
Fig. 245.

## CURLY MESQUITE GRASS.

*Hilaria belangeri* (Steud.) Nash



Figure 245

Perennial; forming extensive flat mats, the stolons rooting at the nodes. Dry plains, foothills, and brushy land, 650—1800 m. elevation; often on heavy clay soils. Blooming occurs sporadically during the growing season.

Curly mesquite is an important range grass in the Southwest. Because of its stolons, it stands up well under heavy grazing. Where it occurs with buffalo grass, it is regarded as inferior to buffalo, being less productive and not curing out as well. The plants greatly resemble those of buffalo grass (*Buchloe dactyloides*, see Fig. 247), but may be distinguished by the spikelets and by the following features: 1. Color. Curly

mesquite is light green when fresh, whitish when dry. Buffalo grass is grayish or olive green when fresh; tan, brownish or purplish when dry. 2. Stolons. The stolons of curly mesquite are round in cross section, very slender, and have tufts of hair at the joints. Those of buffalo grass are oval in cross section, stouter, and smooth at the joints.

- 3b. Plants erect, without stolons; rhizomes present. Fig. 246.

## GALLETA GRASS

*Hilaria jamesii* (Torr.) Benth.

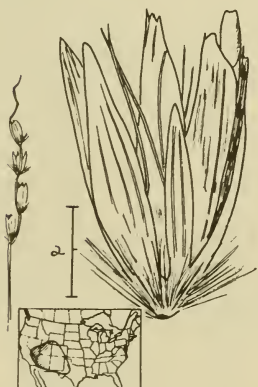


Figure 246

Perennial; culms tough, erect, 30—50 cm. tall, from stout, scaly rhizomes. The racemes of clustered spikelets are whitish. After the groups of spikelets fall, the rachis remains behind as a thin, zig-zag straw. Galleta (pronounced gie-yetta) is an important forage grass on dry plains and deserts in the Southwest. It is fairly palatable to horses and cattle when fresh and green, but is scarcely eaten when dry. June—August.

*Hilaria mutica* Benth. (TOBOSA GRASS) is very similar, but the first glume on each lateral spikelet is fan-shaped. Heavy clay soils, especially on river bottoms where flooding occurs. Western Texas to Arizona.

*Hilaria rigida* (Thurb.) Benth. (BIG GALLETA) is larger, and has the culms covered with a dense white felt of hairs. Southwestern deserts.



## TRIBE VII. CHLORIDEAE

- 1a. Spikelets not inclosed in beads; flowers perfect.....2  
 1b. Pistillate spikelets inclosed in yellowish, bony, bead-like structures;  
 plants unisexual; staminate spikelets borne in 1—3 spikes; plants  
 producing extensive creeping stolons. Fig. 247.

## BUFFALO GRASS

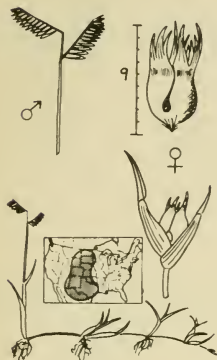
*Buchloe dactyloides* Engelm.

Figure 247

Perennial; spreading widely by stolons; pistillate spikelets inclosed in bead-like bodies with a short green crown on top; staminate spikelets in short, flag-like spikes. The two sexes are borne on separate plants. The diminutive plants are rarely more than 20 cm. tall. Leaves short, curly, grayish-green. Despite its small size, this species is one of the most important forage grasses of the Great Plains, furnishing excellent forage year long. It resembles closely *Hilaria belangeri* (see Fig. 245). For ways of distinguishing the two when not fruiting, see the discussion under that species. Buffalo grass frequently grows with blue grama grass (see *Bouteloua gracilis*, Fig. 271) and resembles it, except that

the grama grass lacks stolons. Blooming time mostly in the spring, but also later in the season.

- 2a. Inflorescences consisting of a few spikelets hidden in the sheaths of stiff, sharp-pointed leaves; annual, making circular or dome-shaped patches from one root. Fig. 248.

## FALSE BUFFALO GRASS

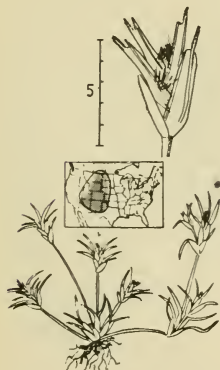
*Munroa squarrosa* (Nutt.) Torr.

Figure 248

Leaves of *Munroa* are stiff, harsh, and somewhat curled backwards. The spikelets are borne in two's or three's on short, one-sided spikes. The small vegetative leaves and glumes are similar and hard to distinguish. The plants grow on overgrazed or disturbed soil in blow-outs, around prairie dog towns, corrals, etc. Forage value very low. June—August.



# HOW TO KNOW THE GRASSES

- 2b. Inflorescence not hidden by the leaves; plants annual or perennial, of various habits.....3
- 3a. Spikelets with 2 or more fertile florets.....4
- 3b. Spikelets with 1 fertile floret, often variously shaped rudimentary ones above the perfect one.....8
- 4a. Spikes numerous, in a panicle.....5
- 4b. Spikes few (usually less than 6), all arising from one central point.....7
- 5a. Spikelets 5—10 mm. long; lemmas awned or awnless.....6
- 5b. Spikelets 1—2 mm. long; lemmas awnless, Fig. 249.

## RED SPRANGLETOP

*Leptochloa filiformis* (Lam.) Beauv.

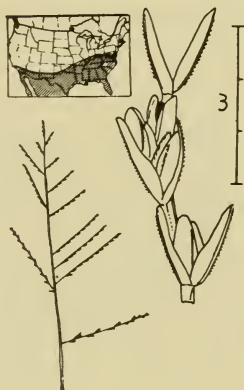


Figure 249

Annual; plants tufted, 20—70 cm. tall. The reddish or purple panicles may be half the height of the plants, with numerous thread-like spikes bearing the very tiny spikelets. Red sprangletop is a rather rampant weed, frequent on bottomlands, in fields, and in gardens. August—September.

- 6a. Lemmas notched at the blunt apex, awnless, glabrous or nearly so.  
Fig. 250.

## GREEN SPRANGLETOP

*Leptochloa dubia* (H. B. K.) Nees

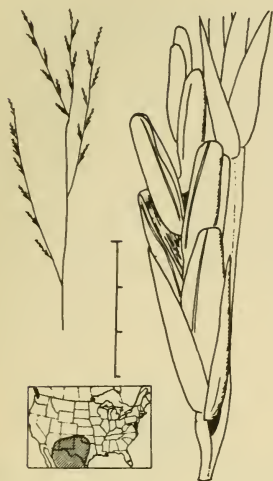


Figure 250

Perennial; tufted; culms 50—100 cm. long, tough, erect; leaf sheaths smooth; blades flat or somewhat rolled or folded, up to 10 mm. wide; panicles up to 15 cm. long, the spreading spikes 3—12 cm. long; spikelets 5—10 mm. long, usually with 5—8 or occasionally fewer florets; lemmas oblong, blunt, the tip notched, the midnerve sometimes protruding. The plants sometimes bear cleistogamous inflorescences hidden in the sheaths. This species has some value as a forage grass in the Southwest. Sandy or rocky open ground. March—September.

- 6b. Lemmas tapering to a sharp point, awned, hairy on the nerves.  
Fig. 251.

## *Leptochloa fascicularis* (Lam.) Gray

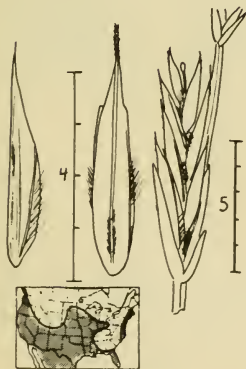


Figure 251

Annual; tufted; culms 30—100 cm. long, erect or horizontally spreading; plants becoming much-branched; leaf blades flat or somewhat rolled; panicles rather stiff, usually partly hidden in the leaf sheaths, 10—20 cm. long, the individual spikes up to 10 cm. long; spikelets 7—12 mm. long, with 6—12 florets; awns ranging from very short to 4—5 mm. long. Moist or alkaline soil, salt marshes, open ground. July—September. This is an unusually widely-ranging grass, extending southward through the American tropics to Argentina. It is sometimes placed in the genus *Diplachne*.

- 7a. Rachis of each spike extending beyond the spikelets as a naked point; second glume awned. Fig. 252.

*Dactyloctenium aegyptium* (L.) Richt.

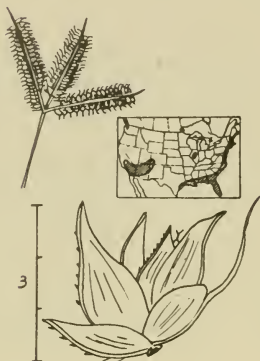


Figure 252

Annual; tufted; culms upright or spreading out and forming mats, rooting at the lower nodes. The seeds (ovary wall is lost) are brownish, about the size of a pinhead, and oddly sculptured. Weed on cultivated ground. This species was apparently once planted by the Indians along the lower Colorado River for grain. Introduced from Europe. Summer, or almost yearlong in the far South.

- 7b. Rachis of the spikes not extended beyond the spikelets; glumes without awns. Fig. 253.

## GOOSEGRASS

*Eleusine indica* (L.) Gaertn.

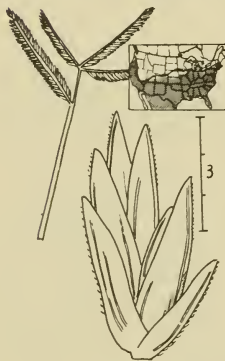


Figure 253

Annual; culms up to 50 cm. long, spreading horizontally or standing erect; plants often making flat mats. Goosegrass is a very common weed of fields, gardens, paths, and disturbed ground generally in the southeastern United States. Introduced from the warmer sections of the world. March—October.

- 8a. Spikelets with a single floret, without sterile or rudimentary ones above it .....9
- 8b. Spikelets with 1 or more modified sterile florets above the perfect one .....14

9a. Plants lacking stolons; rachilla not prolonged beyond the floret. .10

9b. Plants producing extensive creeping stolons; rachilla prolonged beyond the floret as a smooth bristle. Fig. 254.

## BERMUDA GRASS

*Cynodon dactylon* (L.) Pers.

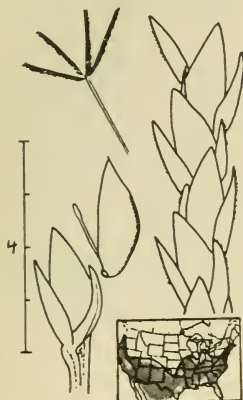


Figure 254

Perennial; producing both stolons and rhizomes and forming a fine green turf; erect portions of culms 10—40 cm. tall, bearing about 4—5 slender spikes at the apex. Bermuda grass is one of the principal lawn grasses in the South and furnishes much pasturage as well. It is very persistent when once established and may become a serious weed pest on agricultural lands. This species is apparently native to the tropics of the Old World, but has become widely dispersed in warmer parts of the world. Blooming period extends through the warm season, and may be yearlong in the subtropics.

10a. Spikelets several times longer than wide, ovate in outline. . . . . 11

10b. Spikelets nearly circular in outline, falling entire. Fig. 255.

## SLOUGH GRASS

*Beckmannia syzigachne* (Steud.) Fern.



Figure 255

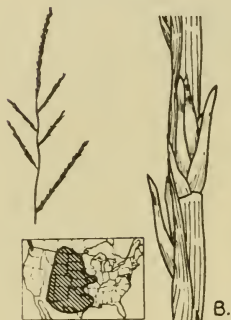
Annual; tufted; plants up to 100 cm. tall. The slender, wand-like panicles of spikes produce large quantities of wrinkled, circular spikelets which shatter from the plants at a touch. Plants rather tender and succulent; forage value good. Wet meadows; shores of ditches and lakes, mostly in the western states. The plants are sometimes cut for hay. July—August.

11a. Plants with rhizomes; spikelets disarticulating below the glumes, falling whole .....12

11b. Plants tufted, lacking rhizomes; spikelets disarticulating above the glumes, the floret dropping. Fig. 256.

## TUMBLEGRASS

*Schedonnardus paniculatus* (Nutt.) Trel.



B.

Perennial; tufted; plants 20—40 cm. tall, with short, crowded basal leaves. Most of the height of the plant is made up of the skeleton-like panicle of very slender spikes. The main axis of the inflorescence is somewhat spiral. The whole panicle breaks from the plant when ripe and rolls with the wind, thereby distributing the seed. This is a grass of poor, dry soil, especially on overgrazed or disturbed areas. Forage value very low. June—August.

Figure 256

12a. Leaf blades flat when fresh, 4—25 mm. wide.....13

12b. Leaf blades rolled, 2 mm. or less wide. Fig. 257.

## SALT-MARSH GRASS

*Spartina patens* (Ait.) Muhl.

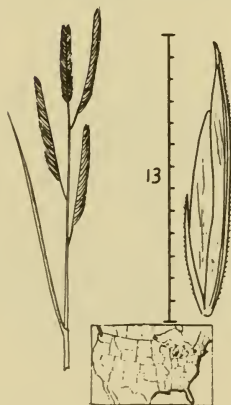


Figure 257

Perennial; spreading by slender, scaly rhizomes, forming large colonies in coastal salt marshes along the Atlantic and Gulf coasts. Culms up to 1 m. tall, usually shorter. This grass is tough and harsh, but is frequently harvested for hay, which is used as packing material. The plants are valuable as land-builders along the coast, trapping and holding the tidal mud. July—September.

*Spartina gracilis* Trin. (ALKALI CORD-GRASS) is similar, but is found on alkali or salty flats in the interior of the United States, from the Dakotas to Kansas, westward to Washington and California.



- 13a. Leaf margins rough to the touch; plants widespread. Fig. 258.

**SLOUGH GRASS**

*Spartina pectinata* Link



Figure 258

Perennial; spreading by tough, scaly rhizomes which are up to 1 cm. thick; culms tall, 1—2 m. in height. The whole plant is coarse and tough, with saw-edged leaves. Slough grass was formerly one of the dominant grasses of the tall grass prairie region of the north central United States. Now it survives largely along roadsides, in ditches, and on wet ground. July—September.

*Spartina cynosuroides* (L.) Roth is taller, has numerous spikes; second glume without an awn. Salt marshes, Atlantic and Gulf coasts.

- 13b. Leaf margins smooth; plants of Atlantic coastal salt-marshes. Fig. 259.

***Spartina alterniflora* Loisel**

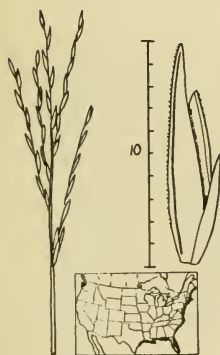


Figure 259

Perennial; spreading by rhizomes; culms .5—2.5 m. tall, thick and spongy; leaf blades flat, 5—15 mm. wide, tapering to a fine point; panicles narrow, the spikes slender and erect, 5—15 cm. long; spikelets about 1 cm. long, the floret smooth or slightly hairy. Coastal salt marshes, often growing in shallow water. Introduced along the coast of southwestern Washington. July—October.

Nearly a century ago, this species was introduced into southern England. There it formed a highly successful natural hybrid with a European species. This hybrid, *Spartina townsendii*, is now building extensive areas of dry land from former tidal mud flats there.

- 14a. Second glume without a protruding bristle on the back; inflorescence of 1—many spikes ..... 15

- 14b. Second glume bearing a protruding bristle on the middle of the keel; inflorescence a single curved spike. Fig. 260.

## TOOTHACHE GRASS

*Ctenium aromaticum* (Walt.) Wood

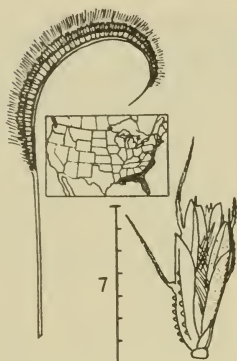


Figure 260

Perennial; tufted; plants 1—1.5 m. tall. The bases of the plants are surrounded by the coarse, fibrous remains of the old sheaths. Toothache grass is a plant of wet pine woods on the sandy coastal plain. The fresh roots are said to have a spicy smell. The plants furnish some forage for cattle in the South. May—July.

- 15a. Fertile lemma with a single long awn or with 3 short awns, or awnless .....16

- 15b. Fertile lemma bearing 3 long awns, at least twice as long as the body of the lemma. Fig. 261.

*Trichloris crinita* (Lag.) Parodi

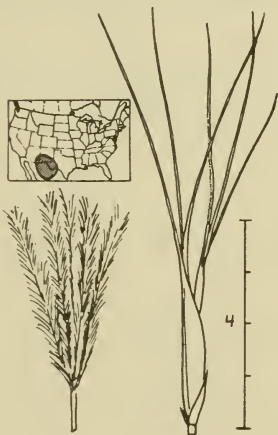


Figure 261

Perennial; tufted; plants 40—100 cm. tall; leaf blades 2—4 mm. wide. The silvery panicle of spikes is vase-shaped, 5—15 cm. long, feathery because of the numerous long awns. Individual spikes are 5—10 cm. long. Spikelets disarticulating above the glumes; second floret rudimentary, reduced to awns; lemmas 3-nerved, all of the nerves extending into the awns, which are about 1 cm. long. The plants are sometimes cultivated for ornament. Fields and rocky open ground. Autumn. Formerly known as *Trichloris mendocina* or *T. blanchardiana*.

- 16a. Spikes borne in one to several whorls, with two to many spikes in each whorl .....18
- 16b. Spikes borne singly at each joint of the rachis.....17

## HOW TO KNOW THE GRASSES

- 17a. Spikes very long and slender (10—20 cm. long), the widely-spaced spikelets parallel to the rachis; spikes numerous, forming an open, dome-shaped panicle. Fig. 262.

*Gymnopogon ambiguus* (Michx.) B. S. P.

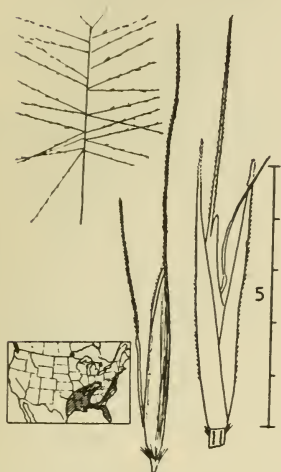


Figure 262

Perennial; tufted or with short rhizomes; culms 30—60 cm. tall, stiff and erect, with overlapping sheaths and short, broad, spreading leaf blades. The slender spikes may reach 15—20 cm. in length, and the whole panicle may be half the total height of the plant. Pine woods, mostly on the Atlantic and Gulf coastal plains. September—November, also in the spring.

- 17b. Spikes thicker, less than 5 cm. long, the closely overlapping spikelets placed at an angle to the rachis; spikes 1—many.....21

- 18a. Lemmas light colored, awned.....19

- 18b. Lemmas dark brown, nearly awnless; spikelets 2 mm. long. Fig. 263.

*Chloris petraea* Swartz

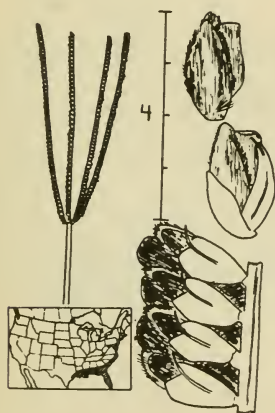


Figure 263

Perennial; tufted or with short stolons; plants up to 100 cm. tall; spikes 4—10 cm. long; lemmas chocolate brown; leaf sheaths and culms strongly keeled; leaf blades pale in color and with rounded tips. This species grows in the pine woods of the southern Atlantic and Gulf coastal plains. August—May.

19a. Lemmas without tufts of white hairs near the apex.....20

19b. Lemmas bearing tufts of long, whitish hairs on the edges near the apex. Fig. 264.

## FEATHER FINGERGRASS

*Chloris virgata* Swartz



Figure 264

Annual; tufted; culms erect or spreading, 40—100 cm. tall; some of the sheaths swollen; leaf blades 2—6 mm. wide; spikes 2—8 cm. long. The slender, vase-shaped panicles of spikes have a silky, white or pinkish cast because of the numerous long awns and fuzzy lemmas. The fertile lemma is about 3 mm. long. The rudimentary floret is wedge-shaped and bears an awn about the same length as that of the fertile lemma. This species is found as a weed in fields, along roadsides and railroad tracks in the Southwest. The occurrences in the eastern states are probably introductions. In New England, the plants occur on wool waste heaps around woolen mills, the seeds being imported in the raw fleeces. July—September.

20a. Plants 1—1.5 m. tall; leaf blades tapering to long, fine points. Fig. 265.

## RHODES GRASS

*Chloris gayana* Kunth



Figure 265

Perennial; spreading by leafy stolons; panicles vase-shaped, 5—10 cm. long; spikelets yellowish, each with two rudimentary florets above the fertile one. Rhodes grass is grown in the southern states for hay and grazing and is found growing wild in fields and on waste ground. It winter kills at 20 degrees F., and so is adapted only to the far South. Introduced from Africa.



20b. Plants 20—50 cm. tall; leaf blades with blunt tips. Fig. 266.

## WINDMILL GRASS

*Chloris verticillata* Nutt.

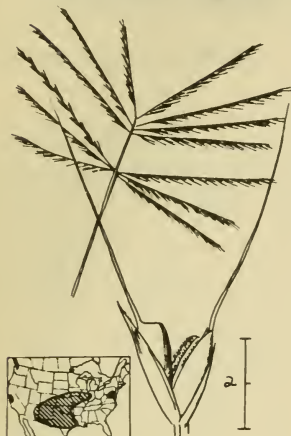


Figure 266

Perennial; culms tufted or with short stolons; leaf sheaths flattened and keeled; ligule membranous and ciliate, short; leaf blades grayish-green, 1—3 mm. wide; panicles of 2 or 3 whorls of stiff, widely-spreading spikes, each 5—15 cm. long. Spikelets rather widely spaced, the spikes slender; spikelets around 3 mm. long; awns 5—8 mm. long; fertile lemma hairy on the nerves; rudimentary lemma blunt. Windmill grass is primarily a plant of the plains of the Southwest, but may appear occasionally as a waif in the North. The mature panicles break off and roll as tumbleweeds. June—September.

21a. Inflorescence of 1—10 spikes, which remain on the plant; florets dropping from the glumes.....22

21b. Inflorescence of numerous spikes, arranged in a slender raceme; entire spikes falling from the rachis whole when ripe. Fig. 267.

## SIDE-OATS GRAMA

*Bouteloua curtipendula* (Michx.) Torr.

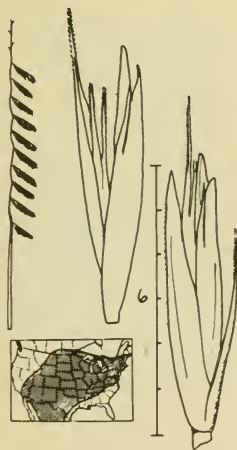


Figure 267

Perennial; culms in tufts, arising from slender rhizomes. The plants range up to 80 cm. in height, most of the height being the long raceme of drooping spikes. Late in the season all of the spikes drop from the flattened rachis, which remains, bearing only the short stalks of the spikes. Side-oats is a very attractive grass, with brilliant orange anthers, contrasting with the usually purple spikes. The name "side-oats" refers to the fact that most of the spikes droop toward one side of the rachis. This is one of the most valuable forage grasses in the western states, furnishing good feed yearlong. Dry plains and open rocky hillsides, from near sea level to 2700 m. June—September.



22a. Plants erect or spreading; internodes of the culms not woolly...23

22b. Plants producing elongate stolons, the internodes covered with conspicuous short white wool. Fig. 268.

## BLACK GRAMA

*Bouteloua eriopoda* Torr.

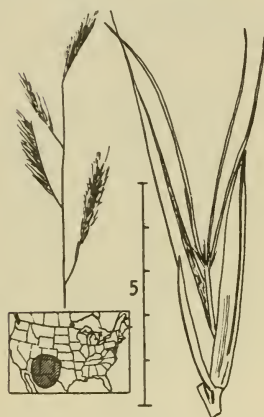


Figure 268

Perennial; plants sprawling, making bushy clumps, the stems thin and weak, rooting at the nodes. The 2—8 spikes are more slender than in the other species of this genus. Black grama is one of the best forage grasses in the southwestern states, furnishing good feed yearlong. Because of its ability to spread by stolons, it stands grazing well and recovers quickly from overuse. Open dry plains and hills, 670—1800 m. elevation. July—September.

23a. Rachis of the spike bearing spikelets to the tip; keels of glumes usually not black-dotted.....24

23b. Rachis of the spike extending beyond the spikelets as a naked point 5—8 mm. long; keel of the second glume bearing prominent black dots. Fig. 269.

## HAIRY GRAMA

*Bouteloua hirsuta* Lag.

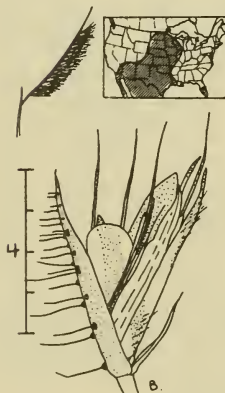


Figure 269

Perennial; tufted; culms 20—60 cm. tall; leaves short, curly, mostly at the base of the plants. Hairy grama is a highly prized forage grass, widespread west of the Mississippi, especially on dry plains and hills, from 670—1800 m. elevation. In the Middle West it is usually found on dry hilltops. Hairy grama furnishes good feed yearlong, but is especially valued for wintertime use. July—October.

- 24a. Spikes 3—7 per culm, each 1—2 cm. long; keels of glumes without long hairs; shallow-rooted annual plants with soft bases. Fig. 270.  
**SIX-WEEKS GRAMA** *Bouteloua barbata* Lag.

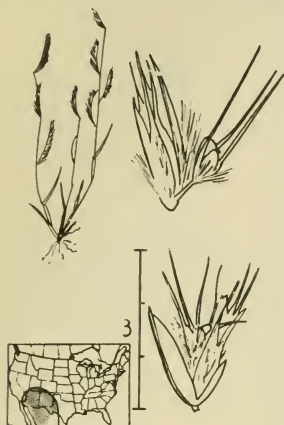


Figure 270

Annual; culms 10—30 cm. long, in small tufts, erect or more commonly spreading out and forming flat mats. The seeds germinate after rains, and the plants mature and die rapidly, hence the name "six-weeks grama." The six-weeks grasses, belonging to a number of genera, furnish short-season feed after heavy rains, but their total forage production is small and they are highly undependable as forage plants. Dry plains, especially on overgrazed pastures. July—October.

- 24b. Spikes 1—3 per culm, each 2.5—5 cm. long; keels of second glumes bearing scattered long hairs; perennial, with hard bases. Fig. 271.

**BLUE GRAMA**

*Bouteloua gracilis* (H. B. K.) Lag.

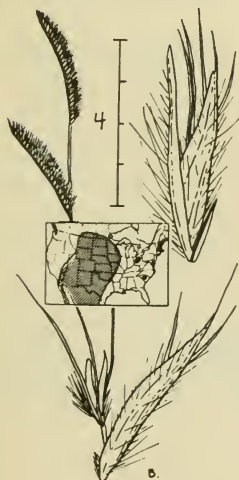


Figure 271

Perennial; tufted; culms 20—100 cm. tall; most of the curly leaves are at the base of the plant. Blue grama is an excellent forage grass on the Great Plains and in the western mountains, furnishing good feed both summer and winter. Open plains, open or lightly timbered mountainsides. It may be confused with buffalo grass (Fig. 247), with which it often grows, but blue grama lacks the creeping stolons of buffalo grass. June—October.

## TRIBE VIII. PHALARIDEAE

1a. Lower florets less than half as long as the fertile floret and closely appressed to it, sterile; glumes usually winged.....2

1b. Lower florets as long as the fertile floret or longer.....3

2a. Plants producing rhizomes; panicles cylindrical and often lobed.  
Fig. 272.

### REED CANARY GRASS

*Phalaris arundinacea* L.

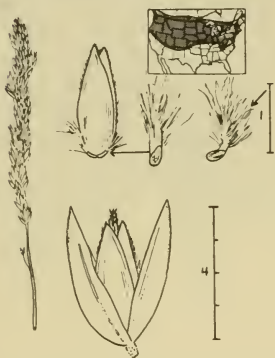


Figure 272

Perennial; plants 60—150 cm. tall, with pale or purplish panicles, 7—16 cm. long. The tall, broad-leaved plants furnish considerable forage and are often cut for hay. They form dense colonies in marshes and along ditches. Reed canary grass is now planted for erosion control on farm waterways. May—August. Forms with white-striped leaves are sometimes grown for ornament, under the name of "gardeners garters."

2b. Plants tufted, lacking rhizomes; panicle dense, thimble-shaped.  
Fig. 273.

### CANARY GRASS

*Phalaris canariensis* L.

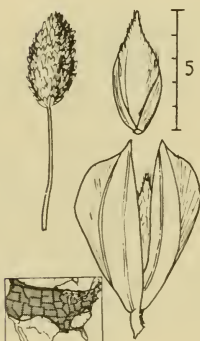


Figure 273

Annual; tufted; culms 30—60 cm. tall; panicles 1—4 cm. long. The strongly winged glumes are striped with green and white lines. This is the species which furnishes the "canary seed" which is fed to caged birds. The plants are found occasionally growing on trash heaps where the sweepings from bird cages are deposited, but this species apparently does not grow as a truly wild plant in this country. Introduced from Europe. June—August.

3a. Lower 2 florets awned, sterile. Fig. 274.

**SWEET VERNAL GRASS**

*Anthoxanthum odoratum* L.



Figure 274

Perennial; tufted; plants 30—60 cm. tall; panicles yellowish-brown, cylindrical, dense, usually less than 6 cm. long; glumes very thin and delicate. The 2 hairy sterile lemmas are split at the tip and awned from the middle of the back. Sweet vernal grass has the delightful fragrance of coumarin, which persists long after the plants are dried. This species was introduced from Europe, presumably as a meadow plant to add fragrance to hay. Now it is widely established as a weed of roadsides, woods, and meadows, except in the dry parts of the United States. It is one of the earliest of spring grasses, blooming from the middle of April to July in the northern states.

3b. Lower 2 florets awnless, staminate. Fig. 275.

**HOLY GRASS**

*Hierochloa odorata* (L.) Beauv.



Figure 275

Perennial; culms 30—60 cm. tall, single or in small tufts, arising from slender creeping rhizomes. Holy grass is an attractive species, with handsome shining golden brown panicles. The glumes are very thin and translucent. The plants have the sweet, vanilla-like scent of coumarin, and were used by the American Indians as material for basketry, and in Europe as perfume in certain religious ceremonies. Moist meadows, bogs, and prairies. April—July.

# TRIBE IX. ORYZEAE

- 1a. Spikelets with evident "glumes," about 1/3 as long as the lemma and palea. Fig. 276.

RICE

*Oryza sativa* L.

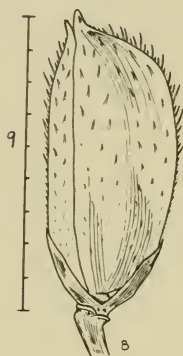


Figure 276

Annual; plants aquatic, stout, 1—2 m. tall; panicles drooping, the very flat spikelets hairy, awned or awnless. The structures which look like glumes are really sterile lemmas; the true glumes are the minute ridges which are left behind at the summit of the pedicel when the floret drops. Rice is one of the principal food crops of the world but its culture is restricted to moist or irrigated regions with warm temperate or tropical climates. In the United States, it is grown only in the lower Mississippi Basin and in Florida and California.

- 1b. Spikelets without evident glumes.....2

- 2a. Sheaths strongly downwardly scabrous; rhizomes slender, with exposed internodes; lower panicle branches whorled. Fig. 277.

CUT GRASS

*Leersia oryzoides* (L.) Sw.

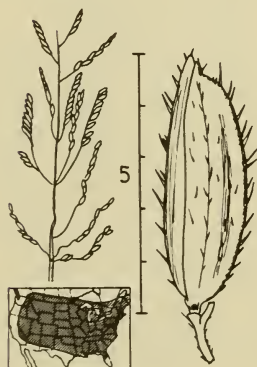


Figure 277

Perennial; culms up to 1.5 m. long; weak and often sprawling; rhizomes long and slender; leaf sheaths and margins of the blades armed with very sharp minute spines which can scratch severely. The plants are very rough to the touch and cling readily to clothing. The glumes of species of *Leersia* are the minute cup-like structures from which the floret drops. Cut grass often forms dense "jungles" along streams or around ponds or in marshes. July—October.

*Leersia lenticularis* Michx. (CATCHFLY GRASS) is similar, but has broadly oval spikelets, 3—4 mm. wide and 4—5 mm. long, arranged in neat overlapping rows.

Wet ground and swamps, Mississippi Valley and southeastern states.



- 2b. Sheaths smooth or nearly so; rhizomes short and thick, densely covered with scales; lower panicle branches borne singly. Fig. 278.

**WHITE GRASS**

*Leersia virginica* Willd.

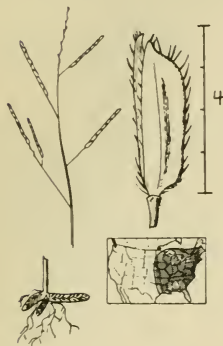


Figure 278

Perennial; culms 50—120 cm. tall, weak and slender; panicle 10—20 cm. long, with a few simple branches, the spikelets lying closely parallel to them. Some of the smaller panicles may be hidden in the sheaths. Leaf blades yellowish green. Damp woods and thickets; mud flats. July—October.

**TRIBE X. ZIZANIEAE**

- 1a. Plants growing immersed in water, the upper leaves 1—5 mm. wide, floating on the water surface. Fig. 279.

**WATER GRASS**

*Hydrochloa carolinensis* Beauv.

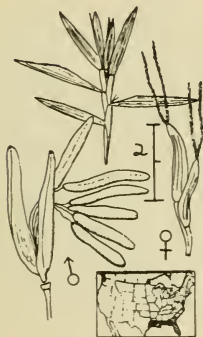


Figure 279

Perennial; culms slender, weak, up to 1 m. long, floating in water, the upper leaves on the surface. The staminate spikelets are borne at the tips of branches and the pistillate ones in the axils of leaves. Neither type has evident glumes, and both have only a single floret. Ponds and slow streams. Furnishes some feed for livestock. Blooming apparently rarely. June—August.

- 1b. Plants with erect tall culms, 1—3 m. tall; leaf blades 1—4 cm. wide ..... 2
- 2a. Pistillate spikelets all at the upper tip of the panicle, forming an erect brush; awns of the pistillate spikelets several times as long as the lemma; staminate spikelets all on spreading lower branches of the panicle. Fig. 280.

WILD RICE

*Zizania aquatica* L.

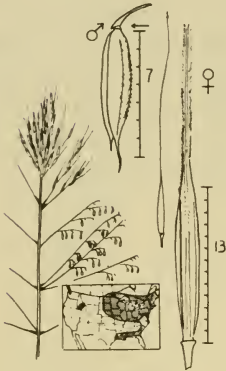


Figure 280

Annual; culms stout, 2—3 m. or more tall; panicles 30—50 cm. long, open and pyramidal. The spikelets consist of single florets, which disarticulate from minute cup-like structures which are the vestiges of glumes. Wild rice was an important food plant for the American Indians, who threshed the standing plants into canoes. It still furnishes some food for human beings and the grain can occasionally be purchased in stores. In nature, wild rice is an important producer of food for water fowl. Shallow water, ditches, ponds, streams and marshes. July—September.

- 2b. Pistillate spikelets intermixed with the staminate ones on the same branches; awns of pistillate spikelets not longer than the lemma. Fig. 281.

SOUTHERN WILD RICE

*Zizaniopsis miliacea* (Michx.) Doell.



Figure 281

Perennial; plants 1—3 m. tall or taller, the culms arising from stout rhizomes; panicles nodding, 30—50 cm. long. Leaves very scabrous on the margins. The spikelets consist of single florets, which disarticulate from the vestigial glumes, as in the previous species. The staminate ones have 6 stamens instead of the usual 3. Marshes and along streams. May—June.

# TRIBE XI. PANICEAE

## 1a. Spikelets inclosed in spiny burs. Fig. 282.

FIELD SANDBUR

*Cenchrus pauciflorus* Benth.



Figure 282

Annual; culms 20—90 cm. long, usually spreading and making mats. The spikelets are mostly concealed by the horribly spiny burs, which are made up of sterile branches. The burs are borne in short spikes along a zig-zag rachis, and fall off at a touch when ripe. The spines of the burs are very sharp, and each spine is microscopically backwardly-barbed. These spines can inflict painful and dangerous flesh wounds. Each bur contains one to several spikelets, which resemble those of species of *Panicum*. Sandbur is an undesirable weed of disturbed soil, much more common on sandy land than on heavier

soils. Where it is abundant, it may furnish some feed for livestock when young. May—October.

*Cenchrus tribuloides* L. (DUNE SANDBUR) has larger burs, 10—17 mm. in diameter. It grows on dunes along the Atlantic and Gulf Coasts.

## 1b. Spikelets not inclosed in spiny burs.....2

## 2a. Spikelets imbedded in one side of an erect, unbranched, flattened, corky rachis. Fig. 283.

ST. AUGUSTINE GRASS *Stenotaphrum secundatum* (Walt.) Kuntze

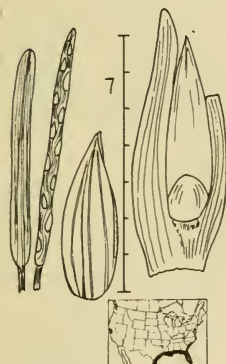


Figure 283

Perennial; plants spreading rapidly and extensively by stolons; erect flowering stems 10—30 cm. tall. The leaf sheaths are very much flattened and keeled; blades with rounded, blunt tips. The spikelets are similar to those of *Panicum* species, but are nearly hidden by the flanges of the rachis. The first glume and sterile lemma are exposed. This unique grass is used for lawns in some localities in the South. Occasionally plants occur with white-striped leaf blades, and these may be cultivated for ornament. June—September.

## 2b. Spikelets not sunken into the rachis.....3

- 3a. Each spikelet accompanied by one to many bristles, which are attached below it; panicles dense, bristly, spikelike.....4
- 3b. Spikelets without accompanying bristles, borne in open or dense panicles or racemes .....11
- 4a. Spikelets (or florets) falling, leaving the bristles on the plant....5

- 4b. Spikelets falling individually or in groups, with the bristles attached to the spikelets. Fig. 284.

## FOUNTAIN GRASS

*Pennisetum setaceum* (Forsk.) Chiov.

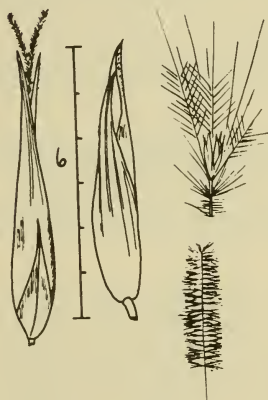


Figure 284

Perennial; tufted; culms up to 1 m. tall, with a hairy, pinkish or lavender, spikelike panicle. The panicle is made up of a straight central axis, 15—35 cm. long, bearing dense clusters of short branches. At maturity, each branch breaks off, carrying with it a spikelet or a small group of spikelets, surrounded by a dense tuft of long (3—4 cm.) bristles. The larger bristles may have branches, feather-fashion. This is a handsome ornamental grass, introduced from Africa. Summer. Formerly known as *P. ruppelii*.

*Pennisetum glaucum* (L.) R. Br. (PEARL MILLET) has a thick spike, looking like

that of the cat-tails. Rarely cultivated for forage in the South. Plants up to 2 m. tall. Bristles of the spikelet-groups short, barely reaching the tips of the spikelets.

- 5a. Bristles upwardly-barbed or smooth; panicles not clinging to objects .....6

## HOW TO KNOW THE GRASSES

- 5b. Bristles downwardly-barbed, clinging to objects when the panicle is brushed upward. Fig. 285.

### BRISTLY FOXTAIL

*Setaria verticillata* (L.) Beauv.

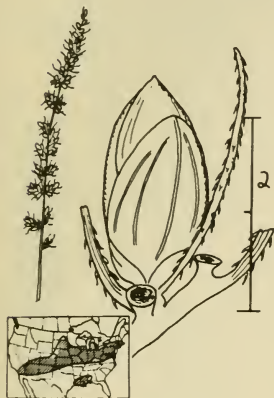


Figure 285

Annual; tufted; culms up to 1 m. tall. The barbed bristles of the panicles not only cause them to adhere to wool, hair, or clothing, but also to each other. After windstorms, the plants will often be densely tangled. Sometimes flies or other insects become caught in the bristles. Common in cornfields and on disturbed soil. June—October. Introduced from Europe.

- 6a. Margins of sheaths bearing short hairs.....7

- 6b. Margins of sheaths smooth, thin and translucent; glabrous except for a few long hairs at the apex. Fig. 286.

### YELLOW FOXTAIL

*Setaria lutescens* (Weigel) Hubb.

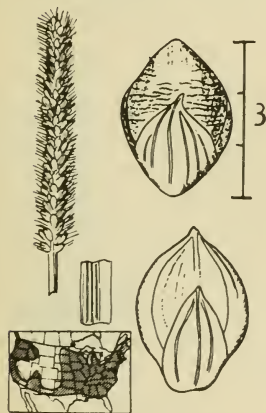


Figure 286

Annual; tufted; culms spreading or erect, up to 1 m. tall; panicles stiff and compact, with a pronounced golden cast, imparted by the yellow bristles; back of the fertile lemma exposed, transversely corrugated. An exceedingly common weed, in cornfields or other disturbed soil. July—October. Introduced from Europe. Also known as *S. glauca*.

*Setaria geniculata* (Lam.) Beauv. has similar panicles but is a perennial, and the culms arise singly or in small tufts from knotty, much-branched rhizomes. Atlantic and Gulf Coast states, from Massachusetts to Texas, lower Mississippi Valley to Illinois and Iowa.



7a. Upper surfaces of leaves glabrous.....8

7b. Upper surfaces of leaves covered with soft hairs. Fig. 287.

## NODDING FOXTAIL

*Setaria faberii* Herrm.

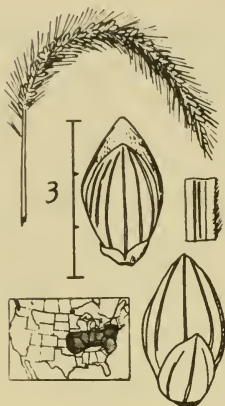


Figure 287

Annual; tufted; culms up to 2.5 m. tall; spikelets 2.6—2.9 mm. long. This species looks much like green foxtail, but is usually larger and has more drooping, larger panicles. The velvety leaf blades are a good mark of recognition. Although known in North America for only about twenty years, nodding foxtail is already a bad weed in parts of the eastern and middle western states. Corn, soybean, and red clover fields; gardens; disturbed soil, especially on river bottomlands. July—September. Introduced from China.

8a. Spikelets dropping from the plants whole.....9

8b. Fertile floret when ripe "shelling out" of the glumes and sterile lemma, leaving them attached to the plant. Fig. 288.

## FOXTAIL MILLET

*Setaria italica* (L.) Beauv.

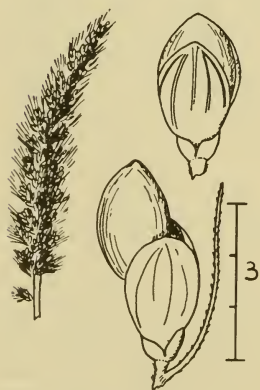


Figure 288

Annual; tufted; plants stout, often 1 m. or more tall, with large, often definitely lobed panicles. Foxtail millet is regarded as being closely related to the wild green foxtail. The fertile lemma is variously yellow, orange, red, brown, or blackish. Millet is cultivated to a small extent as a forage and grain crop. It is sometimes found persisting after cultivation or as a stray in the wild. Introduced from the Orient. July—October.

9a. Plants usually 1 m. tall or shorter; leaf blades usually 1 cm. wide or narrower; plants widespread, not in coastal marshes. . . . . 10

9b. Plants 1—4 m. tall; larger leaf blades 1—4 cm. wide; plants of coastal marshes along the Atlantic and Gulf of Mexico. Fig. 289.  
**GIANT FOXTAIL** *Setaria magna* Griseb.

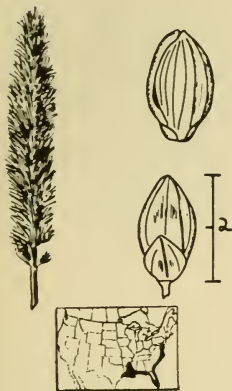


Figure 289

Annual; tufted; culms stout and tall, up to 2 cm. thick and 4 m. tall; leaf blades flat and scabrous, up to 50 cm. long. The immense panicles reach lengths of 50 cm. and diameters of 3.5 cm. They are somewhat nodding and may be lobed at the base, thickest at the middle and tapering toward the ends. Axillary panicles are much smaller than the terminal one. Bristles 1—2 cm. long; spikelets about 2 mm. long; fertile floret smooth and shining, brown when ripe. Giant foxtail is a characteristic plant of coastal marshes, found in the interior only in Arkansas. Its range also extends to the West Indies. August—September.

10a. Plants annual, with soft bases and shallow roots; leaf blades usually less than 15 cm. long, flat; panicles usually less than 10 cm. long, with dense spreading bristles. Fig. 290.  
**GREEN FOXTAIL** *Setaria viridis* (L.) Beauv.

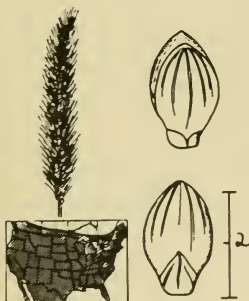


Figure 290

Annual; tufted; becoming much-branched from the base, 20—100 cm. tall; leaf sheaths glabrous except for the short cilia along the margins; blades glabrous, usually less than 10 mm. wide; panicles soft, slightly nodding near the tip; bristles green, rarely purple; spikelets 1.9—2.2 mm. long, greenish except when ripe; second glume and sterile lemma nearly covering the fertile floret; fertile lemma nearly smooth. Green foxtail is one of the commonest weeds of cornfields and other areas of disturbed soil. The bristles are sterile

panicle branches. July—October. Introduced from Europe.

- 10b. Plants perennial, with hard, knotty crowns; leaf blades usually folded, 15—40 cm. long; panicles slender, 2—25 cm. long, with sparse bristles. Fig. 291.

## PLAINS FOXTAIL

*Setaria macrostachya* H. B. K.

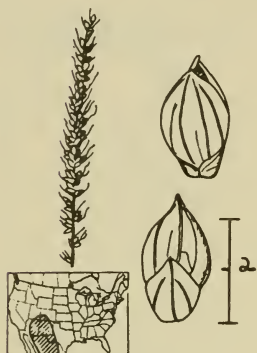


Figure 291

Perennial; in hard tufts; culms 40—120 cm. tall; panicles slender, with the hairy rachis exposed between clusters of spikelets. The plants are leafy and are highly palatable to livestock, so that they are usually kept grazed down except in clumps of spiny bushes. Dry plains and savannas, especially along roadsides or other areas protected from grazing. April—October.

- 11a. Spikelets covered with long, silky, white or brownish or rosy purple hairs ..... 12
- 11b. Spikelets smooth or hairy with short hairs, or silky on the margins only ..... 13
- 12a. Spikelets laterally compressed; second glume and sterile lemma awned; hairs rosy purple. Fig. 292.

## NATAL GRASS; RUBY GRASS

*Rhynchelytrum roseum* (Nees) Stapf & Hubb.

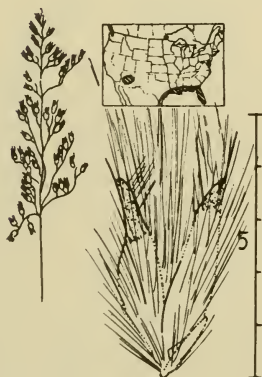


Figure 292

Perennial; tufted; plants about 1 m. tall; panicles rosy-purple, 10—15 cm. long; spikelets on bent or curled pedicels, and densely covered with purple hairs. The second glume and sterile lemma have short awns, which are concealed by the hairs. The lateral compression of the spikelets is very atypical for the Panicoideae. Dry sandy land and open woods. Natal Grass, an introduction from Africa, is grown in Florida for forage and has become naturalized there and also along the Gulf Coast. Winter. Formerly known as *Tricholaena rosea*.

- 12b. Spikelets dorsally compressed, awnless; hairs white. Fig. 293.

## COTTONTOP

*Trichachne californica* (Benth.) Chase

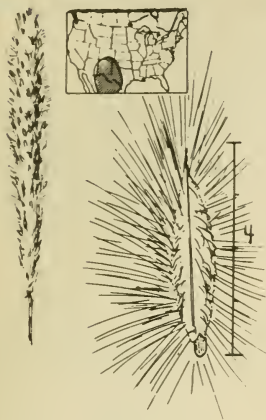


Figure 293

Perennial; tufted, from knotty stooling crowns; plants 30—100 cm. tall, with rather dense, slender panicles 5—10 cm. long. The panicles have a silvery white color, rarely tinged with purple when young; spikelets with a minute first glume; second glume shorter and narrower than the fertile lemma. Cottontop furnishes good summer and winter feed in the Southwest, but is grazed mostly just after rains, when it makes rapid growth. Rocky ridges, margins of fields, in brush. August—October.

- 13a. Spikelet without a cup or ring at the base; first glume present or absent .....14

- 13b. Spikelet with a cup- or ring-like swelling at the base, without an evident first glume. Fig. 294.

## PRAIRIE CUP GRASS

*Eriochloa contracta* Hitch.

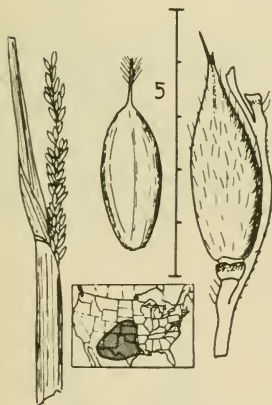


Figure 294

Annual; tufted; culms sometimes decumbent; plants 30—70 cm. tall. The panicles are slender, made up of nearly erect racemes. The cup-like swelling at the base of the spikelet is a modified first glume. The fertile floret is somewhat shorter than the sterile lemma and bears a short, hairy awn which is concealed within the spikelet. Open ground, moist places, ditches. June—October. There are seven other species of this genus, all rather similar, in the southern states.

- 14a. Glumes or sterile lemma awned (the awn sometimes reduced to an abrupt point) .....15

- 14b. Glumes and sterile lemma awnless.....16



- 15a. Lower sheaths glabrous; fertile floret ovoid, 1.9—2.2 times longer than wide. Fig. 295.

**BARNYARD GRASS**

*Echinochloa pungens* (Poir.) Rydb.



Figure 295

Annual; tufted; plants robust, up to 1.5 m. tall, with panicles up to 20 cm. long, with spreading branches. The spikelets are covered with stout, spine-like hairs which arise from little yellowish blisters. Disturbed soil, in ditches, fields, marshes, borders of ponds. August—September.

*Echinochloa crusgalli* (L.) Beauv. is similar but does not have the blister-based stout spines on the spikelets. Just below the withering tip of the fertile lemma is a circle of minute hairs. These are absent in the preceding species. Fields and waste places; widespread; supposedly introduced from Europe.

- 15b. Lower sheaths bristly with stiff hairs; fertile floret elliptical, 2.5—3 times longer than wide. Fig. 296.

*Echinochoa walteri* (Pursh) Nash

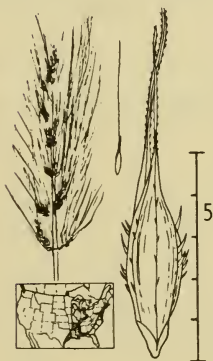


Figure 296

Annual; tufted; robust, up to 2 m. tall; panicles up to 30 cm. long. The spikelets usually bear awns 1—2.5 cm. long. Individuals with glabrous sheaths can be identified by the narrow spikelets. Wet ground or shallow water, sometimes in brackish areas, mostly on the Atlantic and Gulf Coastal Plains. August—September.

- 16a. Spikelets borne in 1—4 rows along the lower sides of one or more slender, spikelike racemes.....17
- 16b. Spikelets borne in open or dense panicles, not exclusively on the lower sides of branches.....28



## HOW TO KNOW THE GRASSES

- 17a. First glume lacking or rudimentary, less than  $1/10$  as long as the spikelet ..... 18
- 17b. First glume present, usually more than  $1/3$  as long as the spikelet. Fig. 297.

### *Brachiaria platyphylla* (Griseb.) Nash

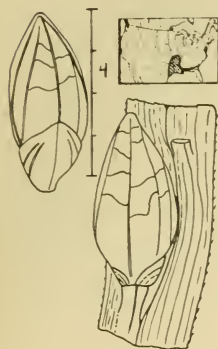


Figure 297

Annual; plants stooling out and sometimes rooting at the lower nodes; culms 25—40 cm. or more long; leaf blades thickish, 4—12 cm. long, 6—12 mm. wide; rachis of the racemes flattened, 1—2 mm. wide; spikelets glabrous 4—4.5 mm. long, the second glume and sterile lemma prolonged beyond the end of the fertile floret, forming a soft beak. Moist sandy ground. Summer. Formerly known as *B. extensa*.

*Brachiaria ciliatissima* (Buckl.) Chase has hairy foliage, and spikelets with woolly second glume and sterile lemma. It makes mats on dry sandy ground, the prostrate culms rooting at the nodes. Texas, Oklahoma, and Arkansas.

- 18a. Fertile floret soft and flexible; margins of the lemma not rolled in ..... 19
- 18b. Fertile floret hard and stiff; margins of lemma rolled in ..... 21
- 19a. Rachis of the racemes thin and flat, with a pronounced midrib. Fig. 298..... 20
- 19b. Rachis of the racemes triangular in cross section. Fig. 299.



Figure 298

### *Digitaria filiformis* (L.) Koel.

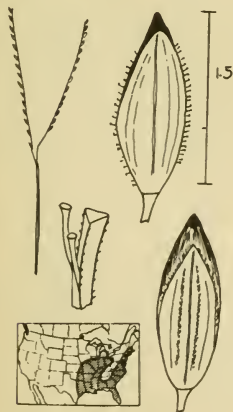


Figure 299

Annual; tufted; culms erect, 10—60 cm. tall; racemes 1—5, up to 10 cm. long. The first glume is absent, and the equal second glume and sterile lemma nearly cover the chocolate brown fertile floret; spikelets about 1.5 mm. long. Dry, usually sandy disturbed soil. August—October.

20a. Fertile floret brownish-black when ripe; leaf sheaths glabrous.  
Fig. 300.

**SMOOTH CRABGRASS** *Digitaria ischaemum* (Schreb.) Muhl.

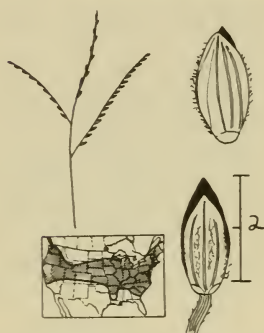


Figure 300

Annual; erect or spreading, often rooting at the lower nodes; culms usually 15—40 cm. long; inflorescence usually of 2—6 racemes. This species frequently grows with the next and is a bad weed in lawns. Disturbed soil, fields, waste places, gardens, lawns. August—October. Introduced from the Old World.

20b. Fertile floret pale or leaden gray when ripe; leaf sheaths sparsely to densely covered with long straight hairs. Fig. 301.

**CRABGRASS** *Digitaria sanguinalis* (L.) Scop.

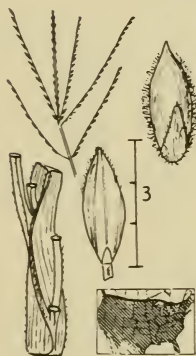


Figure 301

Annual; erect or spreading, usually rooting at the lower nodes; culms up to 1 m. long, the plants often forming large mounds on rich soil. Crab grass is a serious weed in lawns. Being originally from warm climates, it starts growth when hot weather arrives. The rampant plants soon make large patches in lawns, but die out after the first frosts. They also grow abundantly in fields and waste places, sometimes furnishing some forage. July—October. Introduced from the Old World.



Figure 302

21a. Spikelets placed with the back (convex side) of the fertile lemma toward the rachis of the raceme. Fig. 302.....22

## HOW TO KNOW THE GRASSES

- 21b. Spikelets placed with the fertile lemma turned away from the rachis of the raceme. Fig. 303.

### CARPET GRASS

*Axonopus affinis* Chase

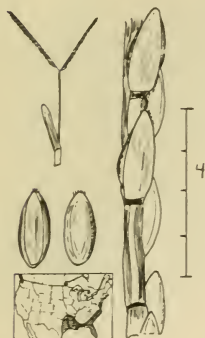


Figure 303

Perennial; producing extensive creeping stolon; erect culms flattened, 20—60 cm. tall; racemes 2—5 on each peduncle, 3—10 cm. long; rachis triangular in cross section, with the spikelets fitting closely against it. The first glume is absent. Low moist sandy or muck soil on the coastal plain, where it is important as a lawn and pasture grass. March—September.

- 22a. Plants with creeping stems; aquatic or on wet ground.....23

- 22b. Stems not creeping.....24

- 23a. Leaf blades, sheaths, and spikelets completely glabrous; spikelets about 2 mm. long. Fig. 304.

*Paspalum dissectum* L.

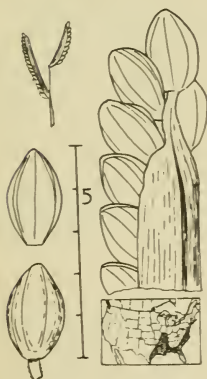


Figure 304

Perennial; plants creeping by extensive stolon; erect culms 20—60 cm. tall, bearing 2—5 racemes, each 2—3 cm. long; leaf blades dark green, 3—6 cm. long, 4—5 mm. wide. The rachis of the raceme is flat and thin, 2—3 mm. wide. The first glume is lacking. Muddy flats and ditches and in shallow water. August—October.

- 23b. Leaf sheaths with tufts of hairs on the auricles; second glume minutely hairy; spikelets 2.5—3.5 mm. long. Fig. 305.

**KNOTGRASS**

*Paspalum distichum* L.



Figure 305

Perennial; spreading by long creeping stolons; erect culms 8—50 cm. tall; inflorescence of 2 or rarely 3 racemes, each 2—7 cm. long and somewhat curved, attached together at the summit of the culm; spikelets often with a minute first glume. Knotgrass forms large flat mats in ditches and on shores of rivers and ponds, usually in fresh water areas, rarely also in brackish localities. May—September. Found also in South America and Europe.

- 24a. Inflorescences borne at the tips of the culms and in the axils of the sheaths (sometimes hidden within the sheaths).....25

- 24b. Inflorescences borne only at the tips of the culms, none in the leaf axils or hidden in the sheaths.....26

- 25a. Spikelets 1.5—1.8 mm. long, minutely hairy or glabrous. Fig. 306.

*Paspalum setaceum* Michx.

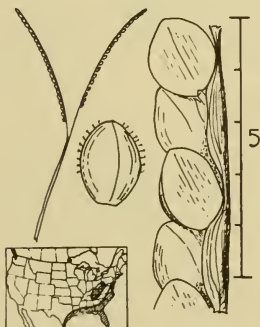


Figure 306

Perennial; tufted from a knotty crown; plants 30—50 cm. tall; hairy; culms slender and erect; leaf sheaths hairy; blades up to 12 cm. long and 2—6 mm. wide, hairy on both surfaces and the edges; inflorescence of 1 or 2 slender, arched racemes, 5—7 cm. long; first glume of spikelets lacking. Dry sandy soil and open woods, especially on the Atlantic and Gulf Coastal Plains. July—September.

*Paspalum debile* Michx. has spreading culms, densely grayish hairy foliage, and minutely hairy spikelets, 1.8—

1.9 mm. long. Most of the foliage is at the base of the plant; upper leaves short. Sandy woods of the Atlantic and Gulf Coastal Plains; Long Island to Mexico and Cuba.



## HOW TO KNOW THE GRASSES

25b. Spikelets 2—2.4 mm. long. Fig. 307.

*Paspalum pubescens* Muhl.

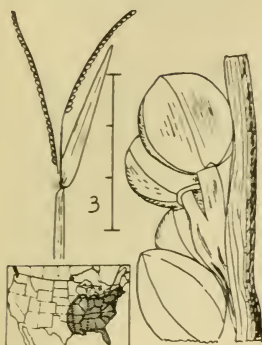


Figure 307

Perennial; tufted; plants 40—90 cm. tall, hairy; inflorescence consisting of 1—3 racemes, each 4—17 cm. long; first glume absent. Old fields, meadows, waste ground, open woods, especially on sandy land. June—September. This is one of the commonest species, and extremely variable. There are about four closely related species found in parts of its range.

26a. Spikelets not fringed with long hairs.....27

26b. Spikelets fringed with long silky hairs, borne on the edges of the second glume. Fig. 308.

DALLIS GRASS

*Paspalum dilatatum* Poir

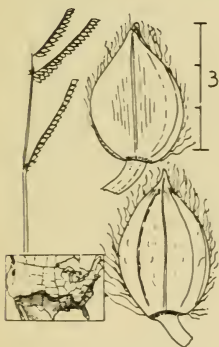


Figure 308

Perennial; tufted; plants 50—150 cm. tall; inflorescence of 3—5 racemes, each 6—8 cm. long; first glume absent. The spikelets are more pointed than those of most other species. Dallis grass is a valuable pasture grass in the southeastern states and under irrigation in the Southwest. The spikelets may become infected by an ergot fungus and hence become poisonous to cattle. Cultivated meadows and pastures and commonly escaped to the wild. May—September. Native to South America.

*Paspalum urvillei* Steud. (VASEY GRASS)  
is similar but has 12—20 racemes and strongly hispid lower sheaths. Virginia to Florida, Arkansas and Texas; California.



27a. Plants 1—2 m. tall; spikelets 4—4.5 mm. long. Fig. 309.

*Paspalum floridanum* Michx.

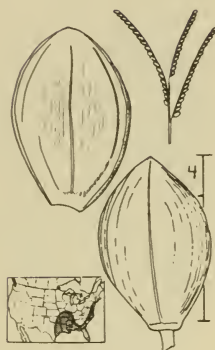


Figure 309

Perennial; culms single or in small tufts from short rhizomes; plants robust, 1—2 m. tall; foliage hairy or glabrous; inflorescence of 2—5 racemes, each 4—12 cm. long. The axis of the racemes is strongly zig-zag after the spikelets drop off. First glume absent. Low moist sandy barrens, Atlantic and Gulf Coastal Plains and northward in the interior. July—October.

27b. Plants less than 1 m. tall; spikelets less than 3.2 mm. long. Fig. 310.

*Paspalum laeve* Michx.

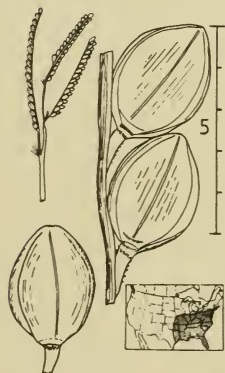


Figure 310

Perennial; tufted; plants 40—100 cm. tall; foliage glabrous or hairy. The inflorescence consists of 3—4 racemes, each 3—10 cm. long. The first glume is absent. This is a common species, varying greatly in hairiness of leaves and shape of spikelets. In typical plants, the spikelets are broadly oval. In var. *circularis* (Nash) Stone, they are nearly circular. Old fields, waste ground, meadow, open woods. July—October.

28a. Second glume not sack-like nor swollen at the base; fertile floret about as long as the second glume and sterile lemma.....29

## HOW TO KNOW THE GRASSES

- 28b. Second glume sack-like, swollen, the spikelet hence "lop-sided"; fertile floret about half as long as the sterile lemma. Fig. 311.

### SACK GRASS

*Sacciolepis striata* (L.) Nash

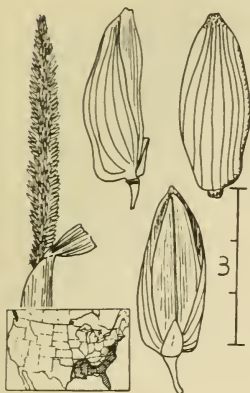


Figure 311

Perennial; culms often decumbent and rooting at the lower nodes, up to 2 m. long. The leaf sheaths may be bristly-hairy or smooth. Panicles dense, cylindrical, 6—30 cm. long. The spikelets are flat on the first glume side, very bulging at the base on the second glume side. Ditches, marshes and swamps, on the Atlantic and Gulf Coastal Plains. June—December.

- 29a. First glume absent or minute, less than  $1/10$  as long as the spikelet ..... 30

- 29b. First glume present, usually at least  $1/4$  as long as the spikelet. 31

- 30a. Spikelets hairy, 2—3 mm. long; no underground spikelets present. Fig. 312.

### FALL WITCHGRASS

*Leptoloma cognatum* (Schult.) Chase

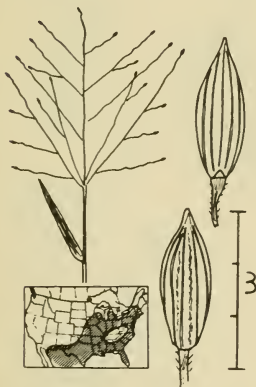


Figure 312

Perennial; plants stiffly spreading or erect, in large tufts; culms 30—70 cm. long; panicles very open, with stiffly spreading, thin, somewhat zig-zag branches. The pedicels of the individual spikelets may be up to 20—30 times the length of the spikelet. The second glume and sterile lemma bear appressed hairs. When mature, the panicles break off and roll away as tumbleweeds. Dry sandy open soil. May—September.

- 30b. Spikelets glabrous, 4—7 mm. long; underground spikelets present on leafless, root-like shoots. Fig. 313.

## PEANUT GRASS

*Amphicarpum purshii* Kunth

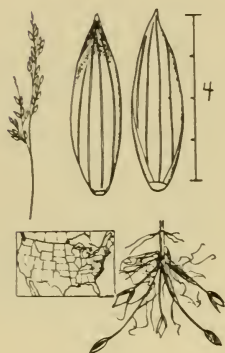


Figure 313

Annual; plants hairy, tufted, erect, 30—80 cm. tall. From the crown of the plant arise slender underground runners, 2—5 cm. long, each bearing a single large spikelet, 7—8 mm. long, at its tip. Most of the seed is produced by these underground spikelets, the aerial panicles being sterile. See also Fig. 330, which shows a subterranean spikelet. Sandy or peat soil, pine barrens of the Atlantic Coastal Plain. Fall.

*Amphicarpum muhlenbergianum* (Schult.) Hitch. is perennial, has smooth leaves and stout underground rhizomes, bearing subterranean spikelets. Pine barrens, South Carolina to Florida.

- 31a. Plants blooming twice, bearing panicles at the tips of the culms in spring or early summer, and small axillary panicles later; winter rosettes of short, broad leaves present in most species; all perennial species. Fig. 314 .....32

- 31b. Plants blooming once, all the panicles produced at the same period; winter rosettes not present; plants annual or perennial..41



Figure 314

- 32a. Leaf blades of the culms less than 15 times longer than wide; plants forming winter rosettes of short, broad leaves.....33

## HOW TO KNOW THE GRASSES

- 32b. Leaf blades of the culms very narrow, 20 or more times longer than wide; plants without winter rosettes of broad leaves. Fig. 315.  
*Panicum depauperatum* Muhl.

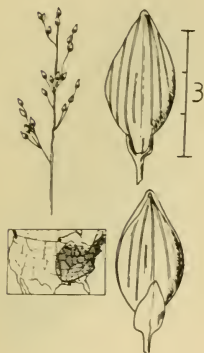


Figure 315

Perennial; tufted; plants 15—40 cm. tall, with hairy or smooth leaf blades, up to 15 cm. long and 2—5 mm. wide. The terminal panicles, produced in May and June, are open, pyramid-shaped, and on long, slender peduncles. The secondary panicles consist of a few spikelets and are concealed among the basal leaf blades. The second glume and sterile lemma form an empty beak which protrudes beyond the tip of the fertile lemma. Open dry woods and barren ground. May—June.

- 33a. Ligules conspicuous, of straight hairs, 2—5 mm. long.....34

- 33b. Ligules 1 mm. or less long.....35

- 34a. Upper leaf sheaths glabrous; lower sheaths also usually glabrous; leaf blades glabrous or sometimes hairy on the edges only. Fig. 316.

*Panicum lindheimeri* Nash

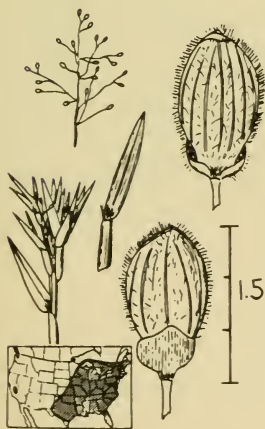


Figure 316

Perennial; tufted, at first rather slender, 30—100 cm. tall. The plants later produce dense tufts of short, leafy branches, in the axils of the leaves, with small secondary panicles partially concealed among these leaves. The culms may then topple and the plants form flat circular mats. Terminal panicles blooming from May—July. Open dry ground and dry open woods.

- 34b. Leaf sheaths and usually the blades conspicuously hairy. Fig. 317.  
*Panicum implicatum* Scribn.

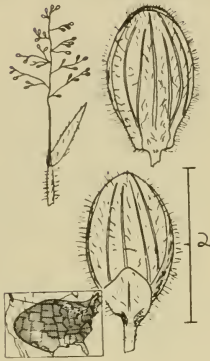


Figure 317

Perennial; tufted; plants 15—75 cm. tall, with open, pyramid-shaped terminal panicles blooming in May and June. Later the plants become much-branched, with loose axillary tufts of short leafy branches, interspersed with the short secondary panicles. Roadsides, old fields, open woods, meadows, swamps. Very common and widespread. *Panicum implicatum* is usually broken up into a number of scarcely distinguishable "species" by other authors. *P. columbianum* (see Fig. 324) is quite similar.

- 35a. Plants smooth or somewhat hairy, never velvety to the touch. . . . .36

- 35b. Culms, leaf blades, and sheaths softly velvety to the touch, grayish; a smooth, sticky ring is present below each node. Fig. 318.  
*Panicum scoparium* Lam.

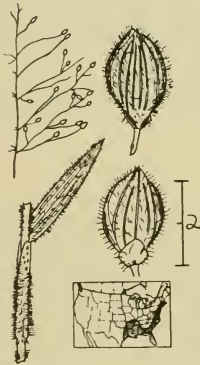


Figure 318

Perennial; tufted; plants 80—130 cm. tall; leaf blades large, 12—20 cm. long and 10—20 mm. wide. The terminal panicles are open, elliptical, up to 15 cm. long, produced in June and July. Later the plants become branched, with loose bunches of leaves in the axils of the sheaths of the main culm. The small secondary panicles are partially concealed among these branches. Low moist soil, mostly on the Atlantic Coastal Plain and northward in the Mississippi Valley.

- 36a. Spikelets over 3 mm. long. . . . .37

- 36b. Spikelets 2.7 mm. or less long. . . . .38



## HOW TO KNOW THE GRASSES

- 37a. Upper leaf sheaths bristly hairy with spreading hairs; leaf blades 6—12 mm. wide. Fig. 319.

*Panicum scribnerianum* Nash

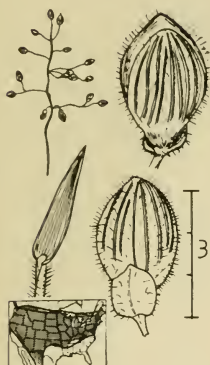


Figure 319

Perennial; tufted; plants 20—50 cm. tall, rather stiff; sheaths sparsely covered with stiff spreading bristles or nearly smooth. The terminal panicles, produced in May and June, are 4—8 cm. long and about as broad, pyramid-shaped. After the terminal panicles have shed their spikelets, the plants become bushy-branched and produce small, simple panicles partially concealed by the tufted upper leaves. Prairies and open woods, often on dry sandy soil.

- 37b. Upper sheaths glabrous or softly hairy; larger leaf blades 1.5—4 cm. wide. Fig. 320.

*Panicum latifolium* L.

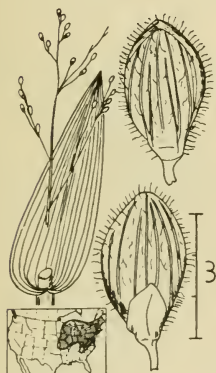


Figure 320

Perennial; tufted; 45—100 cm. tall; terminal panicles produced in June, about 10 cm. long and nearly as wide, with stiff spreading branches; spikelets hairy, 3.4—3.7 mm. long. This is one of the most easily recognized of all grasses. The very broad leaf blades are heart-shaped at the base. Roadsides, woods, stream banks. The following species are also wide-leaved.

*Panicum clandestinum* L. has very bristly sheaths on the secondary branches. Spikelets 2.7—3 mm. long.

*Panicum boscii* Poir. has spikelets over 4 mm. long. The nodes of the stems are bearded with soft hairs, and the foliage is sometimes hairy.

- 38a. Culms glabrous ..... 39

- 38b. Culms covered with short fuzz and sometimes with longer hairs. . 40

## HOW TO KNOW THE GRASSES

- 39a. Spikelets glabrous, narrowly elliptical, 1.8—2.2 mm. long; leaf blades not hairy on the margins. Fig. 321.

*Panicum dichotomum* L.

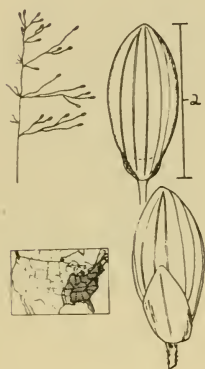


Figure 321

Perennial; tufted; plants erect, 30—50 cm. tall, glabrous or with a ring of hairs on the lower nodes; terminal panicles in June, 4—9 cm. long, with spreading branches. Later the culms become much branched from the middle nodes, appearing like little trees and sometimes falling from their weight. The secondary panicles are small, with few spikelets. They extend slightly above the leaves of the branches. Widespread and common in rocky woods and on brushy land.

*Panicum microcarpon* Muhl. has strongly bearded nodes and tiny spikelets, 1.5—1.7 mm. long. Moist woods, meadows, and swamps.

- 39b. Spikelets minutely hairy, broadly obovoid at maturity, 1.5—1.8 mm. long; leaf blades 7—14 mm. wide, with long marginal hairs at the base. Fig. 322.

*Panicum sphaerocarpon* Ell.

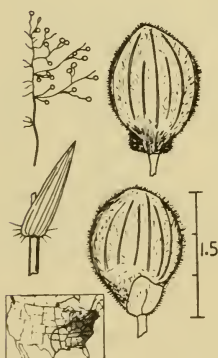


Figure 322

Perennial; tufted; culms 20—55 cm. long, erect or spreading; plants glabrous except for the few hairs at the base of each leaf blade, and often somewhat glaucous. Leaf blades rather broad, the top one 4—9 mm. in width. The broad panicle is less than twice as long as wide. Dry open ground and thin woods. Terminal panicles in June and July.

*Panicum polyanthes* Schult. has a longer, elliptical panicle, 2—4 times longer than wide, and an uppermost leaf 9—28 mm. wide. Open woods and damp ground. Southern New England to Oklahoma and southward.

## HOW TO KNOW THE GRASSES

- 40a. Spikelets 2.2—2.7 mm. long; leaf sheaths glabrous; culm internodes covered with short, bent hairs. Fig. 323.

*Panicum ashei* Pearson

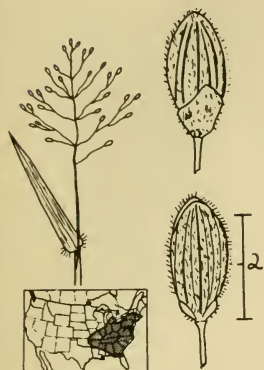


Figure 323

Perennial; tufted; plants stiffly erect, 25—50 cm. tall. The pyramid-shaped primary panicles are 5—8 cm. long and have rather few spikelets. The internodes of the culms and portions of the leaf blades tend to be purple. The plants become rather sparingly branched, with elongated branches. Dry rocky woods, brushland, often on sandy ground. Primary panicles produced from May to July.

- 40b. Spikelets 1.5—1.9 mm. long; leaf sheaths hairy; at least some of the sheaths and internodes covered with a mixture of long hairs and short, fine fuzz. Fig. 324.

*Panicum columbianum* Scribn.

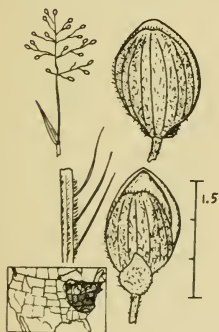


Figure 324

Perennial; tufted; plant 15—50 cm. tall; leaf blades 3—6 cm. long, 3—5 mm. wide, the upper surface glabrous and the lower with fine, short hairs; primary panicles ovoid, 2—7 cm. long, produced in June and July. Later the plants become much-branched and bushy, often making mats on the ground. Dry sandy or rocky sterile ground, in the open or in thin woods.

*Panicum meridionale* Ashe. Plants small and delicate; leaf blades 1.5—3 cm. long, 2—4 mm. wide; upper surfaces of leaves bearing long, erect hairs; spikelets 1.3—1.5 mm. long. Sterile soil; N. S. to Minn., Ga., and Ala.

- 41a. Spikelets glabrous or hairy, never warty.....42

41b. Spikelets glabrous, covered with minute warts. Fig. 325.

*Panicum verrucosum* Muhl.

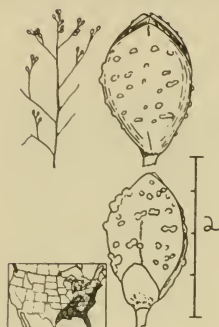


Figure 325

Annual; plants sprawling, the culms branching and rooting from the lower nodes, up to 150 cm. long. The entire herbage is glabrous except for the margins of the sheaths; leaf blades thin, bright green, 5—20 cm. long, 4—10 mm. wide; ligules very short, hairy; panicles up to 30 cm. long, very open, the small (about 2 mm. long) spikelets borne in groups of 1—3 near the ends of the branches. Banks of streams; moist sandy or peaty soil. July—September.

*Panicum brachyanthum* Steud. has narrower leaf blades, 2—3 mm. wide; pointed spikelets 3.2—3.6 mm. long, covered with wart-based hairs. August—September. Arkansas and Oklahoma to Louisiana and Texas.

42a. Fertile lemma minutely cross-wrinkled. Fig. 326.

.....43

42b. Fertile lemma smooth and shining.....44



Figure 326

43a. Spikelets 5—6 mm. long, hairy. Fig. 327.

TEXAS MILLET; COLORADO GRASS

*Panicum texanum* Buckl.

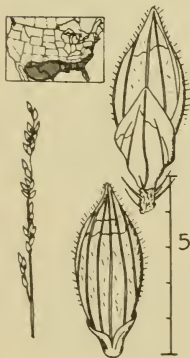


Figure 327

Annual; culms hairy, erect or decumbent and rooting at the lower nodes, usually 50—150 cm. long; leaves 7—16 mm. wide, 10—20 cm. long, softly velvety; leaf sheaths velvety; ligule hairy, about 1 mm. long; panicles narrowly cylindrical, 7—25 cm. long, up to 3 cm. in diameter; rachis and branches hairy. The lush, vigorous plants make good forage. They occur along streams and in corn and cotton fields. The common name, Colorado Grass, apparently refers to the Colorado River of Texas, since this species does not occur in the state of Colorado. June—September.

*Panicum arizonicum* Scribn. and Merr. has similar spikelets, 3.5—3.8 mm. long; blades 6—12 mm. wide; panicle more open, with hairy branches. Western Texas to California and Mexico. August—September.

## HOW TO KNOW THE GRASSES

43b. Spikelets 2—4 mm. long, glabrous. Fig. 328.

### BROWNTOP MILLET

*Panicum fasciculatum* Swartz

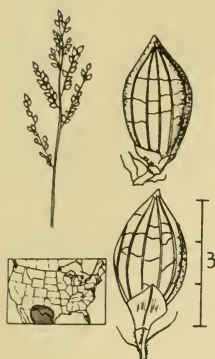


Figure 328

Annual; tufted, rather bushy; culms 30—100 cm. long; leaf blades 6—20 mm. wide, glabrous; ligule of hairs, 1 mm. long; sheaths glabrous or papillose-hairy; panicles 5—15 cm. long, made up of simple branches 5—10 cm. long, the spikelets nearly sessile on the branches; spikelets frequently yellowish or brown, 2—3 mm. long, with pronounced cross-veins between the longitudinal ones.

Var *reticulatum* (Torr.) Beal has pubescent leaf blades, 6—10 mm. wide; spikelets 2.6—3.2 mm. long.

These plants are common weeds in fields, on river flats, and on waste ground. May—September.

44a. Plants without stolons; first glume much shorter than the whole spikelet ..... 45

44b. Plants producing long, wiry stolons; spikelets very blunt, the first glume nearly as long as the spikelet. Fig. 329.

### VINE MESQUITE GRASS

*Panicum obtusum* H. B. K.

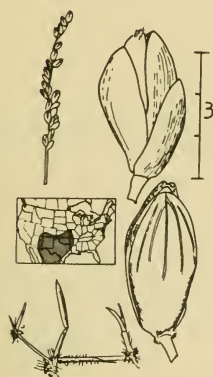


Figure 329

Perennial; producing elongated stolons up to 3 m. or more in length, their nodes hairy, swollen; culms erect, flattened, 20—80 cm. tall, with glabrous nodes; leaf blades 2—7 mm. wide, glabrous; ligules 1 mm. long, membranous; panicles 3—12 cm. long, very narrow, with a few ascending branches; spikelets crowded, 3—3.8 mm. long, glabrous, brownish; sterile lemma containing a palea and a staminate flower. Banks of streams, ditches, dry washes, irrigated fields. Vine mesquite furnishes some grazing, especially in the spring. It is sometimes planted for erosion control, especially on terrace outlet channels, spillways of earth dams, and flood plain flats. June—September.



# HOW TO KNOW THE GRASSES

45a. Plants producing underground spikelets on root-like underground branches; aerial panicles sterile. Fig. 330 .....30b

45b. Plants lacking underground spikelets; panicles fertile .....46

46a. Panicles with spreading or drooping branches; rhizomes present or absent.....47

46b. Panicles long and slender, with erect branches; plants producing extensive rhizomes. Fig. 331.

## MAIDEN CANE

*Panicum hemitomom* Schult.



Figure 330

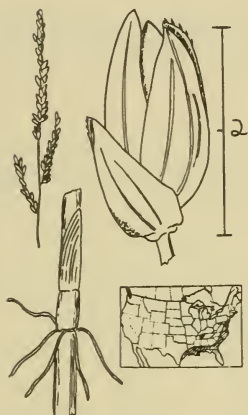


Figure 331

Perennial; culms hard and stiff, 50—150 cm. tall; sheaths smooth or bristly; leaf blades 10—25 cm. long, 7—15 mm. wide, scabrous on top; panicles slender and spikelike, 15—30 cm. long; spikelets 2.3—2.7 mm. long. Wet ground and in water; ponds and ditches, wet fields, on the Atlantic and Gulf Coastal Plains. Sometimes maiden cane becomes a weed in wet fields. April—July.

47a. Panicle much-branched, open, the spikelets usually on long stalks, not confined to the lower sides of the branches; fertile lemma not hairy at the tip .....48

47b. Panicle with mostly unbranched main branches, the spikelets on short stalks, mostly on the lower sides of the branches; fertile lemma with a tuft of minute stiff hairs at the tip.....51

48a. Sheaths covered with stiff spreading hairs.....49

48b. Sheaths glabrous .....50

- 49a. Spikelets 3.5 mm. long or shorter; panicle branches slender, stiff.  
Fig. 332.

WITCH GRASS

*Panicum capillare* L.

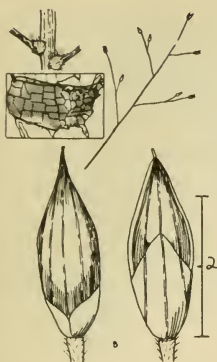


Figure 332

Annual; tufted; becoming bushy-branched, often a meter or more tall; foliage soft; leaf blades hairy on both surfaces, 5—15 mm. wide; terminal panicles large, dome-shaped, often more than half the length of the plant; numerous axillary panicles also present; bases of panicles usually hidden in the sheaths; axils of main panicle branches bearing tufts of hairs; panicles at maturity breaking away from the plant and rolling away as tumbleweeds. This is one of the commonest weedy grasses of fields and disturbed soil; widespread in the United States. About eight similar species are found in various parts of the country, but are much less common. July—October.

- 49b. Spikelets 4.5 mm. or more long; panicle branches stout, drooping.  
Fig. 333.

BROOMCORN MILLET; PROSO MILLET

*Panicum miliaceum* L.

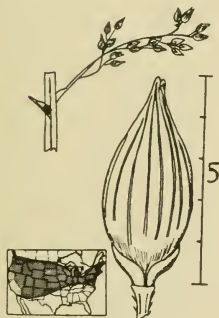


Figure 333

Annual; tufted; plants 20—100 cm. tall; foliage coarsely hairy or nearly smooth; leaf blades up to 30 cm. long and 20 mm. wide; panicles 10—30 cm. long, drooping, the branches scabrous; spikelets 4.5—5 mm. long, plump; fertile lemmas yellow, reddish, or brown. Proso is grown sparingly in the United States for forage, hog feed, and bird seed. The plants occur as strays on waste ground. Proso is probably native to Asia. It is cultivated in the Orient, and to a lesser extent in Europe. It is supposed to be one of the most ancient of cultivated crops, and was known to the Romans under the name of *Milium*, whence comes our word millet. July—September.

## HOW TO KNOW THE GRASSES

- 50a. First glume rounded or broadly triangular,  $1/4$ — $1/3$  as long as the spikelet; plants annual, without rhizomes. Fig. 334.

### FALL PANICUM

*Panicum dichotomiflorum* Michx.

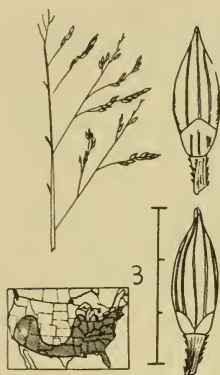


Figure 334

Annual; tufted; plants bushy, with freely branching erect or spreading culms; often coarse, with culms up to 2 m. long in vigorous specimens; stems often zig-zag, with an axillary panicle at each upper node. This is a common weed of cultivated fields, waste ground and moist soil around ponds or along streams. The size of the plants varies greatly, depending upon the moisture and fertility of the soil. July—October.

- 50b. First glume at least half the length of the spikelet, tapering to a sharp point; plants perennial, with hard, rhizome-producing bases. Fig. 335.

### SWITCH GRASS

*Panicum virgatum* L.



Figure 335

Perennial; in clumps, spreading by thick scaly rhizomes; culms strong, 1—2 m. tall; panicles large and open, 15—50 cm. long; spikelets 3.5—5 mm. long, often reddish in color and at times appearing laterally compressed. Switch grass is one of the most important native grasses of the tall grass prairie, but occurs far beyond the prairie area as well. Prairies, open ground, river banks and bottomlands, thin woods. A valuable forage species, sometimes harvested as a part of wild prairie hay. July—October.

51a. Plants producing rhizomes; spikelets scythe-shaped, set at an angle to the pedicel. Fig. 336.

*Panicum anceps* Michx.

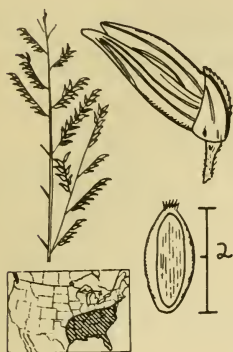


Figure 336

Perennial; short scaly rhizomes present; culms erect, 50—100 cm. tall; leaves smooth or hairy, elongated, 4—12 mm. wide; panicles open, 15—40 cm. long; spikelets 3.4—3.8 mm. long, curved. Open moist ground and woods, especially on sandy soil. July—September.

*Panicum rhizomatum* H. & C. is similar but has more elongated rhizomes, contracted panicles, and spikelets 2.4—2.8 mm. long. Sandy soil on the Atlantic and Gulf Coastal Plains, Maryland to Texas; Tennessee.

51b. Plants without rhizomes; spikelets straight or nearly so, set in line with the pedicel. Fig. 337.

*Panicum agrostoides* Spreng.

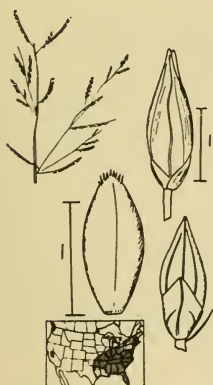


Figure 337

Perennial; tufted; culms 50—100 cm. tall; panicles elliptical, the branches densely clustered with nearly sessile spikelets; spikelets green or somewhat reddish, 1.8—2.2 mm. long. Moist shores and meadows, swamps, alluvial mud flats. July—September.

*Panicum condensum* Nash is similar but has a denser panicle; spikelets 2.2—2.5 mm. long. Wet ground on the Coastal Plains, Pennsylvania to Florida and Texas.

# TRIBE XII. ANDROPOGONEAE

- 1a. Both spikelets of each pair on stalks.....2
- 1b. One spikelet of each pair sessile.....4
- 2a. Racemes single on each peduncle; awns hairy.....11b
- 2b. Racemes several to many on each peduncle; awns absent or smooth .....3
- 3a. Inflorescence narrow, spikelike; spikelets awnless. Fig. 338.

## SATINTAIL

*Imperata brevifolia* Vasey



Figure 338

Perennial; culms arising from hard scaly rhizomes; culms 1—1.5 m. tall, with elongated leaves and slender, silvery-hairy panicles, 15—35 cm. long and 1—3 cm. thick. The spikelets are about 3 mm. long and have a ring of long white hairs at the base, with some hairs also attached to the backs of the glumes. The spikelets fall from the rachis when ripe. Deserts. July—September.

*Imperata cylindrica* (L.) Beauv. (COGON GRASS) has been introduced in western Florida. Spikelets 4—5 mm. long. This species has forage uses but may become a weed, because of its extensive rhizomes.

- 3b. Inflorescence fan-shaped; spikelets with awns. Fig. 339.

## EULALIA

*Miscanthus sinensis* Anderss.



Figure 339

Perennial, forming large clumps; culms 2—3 m. tall, with plumelike, silvery-gray, fan-shaped panicles of long, hairy racemes. The spikelets are about 5 mm. long, with a ring of hairs about as long as the spikelet, attached at the base of the glumes. The spikelets fall from the rachis when ripe. Cultivated widely as an ornamental, and escaping to the wild occasionally around inhabited places. Horticultural forms with white striped or cross-banded leaves are also grown. September—October. Native to Asia.



4a. Each raceme\* of spikelets consisting of many pairs of spikelets; racemes solitary or variously grouped.....5

4b. Each raceme\* consisting of 1—3 pairs of spikelets; racemes grouped into an open or dense panicle.....15

5a. Both spikelets of each pair alike and with perfect florets.....6

5b. One spikelet of each pair perfect, the other either staminate, sterile, reduced in size, of a different shape, or nearly absent.....7

6a. Spikelets with awns; wild plants. Fig. 340.

## SILVER PLUMEGRASS

*Erianthus alopecuroides* (L.) Ell.

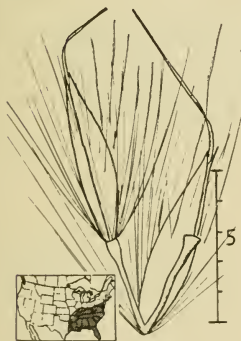


Figure 340

Perennial; culms strong and tall, 1—3 m. long, arising from short, scaly rhizomes. The nodes, upper portions of the sheaths, and peduncles are appressed-hairy. The dense silky-hairy elliptical panicles are 20—30 cm. long. Each yellowish spikelet bears a tuft of long silvery or purplish hairs from the base, as well as a few hairs on the upper portions of the glumes. Spikelets 5—6 mm. long, with a flattened and twisted awn 1—1.5 cm. long. The rachis breaks up into individual joints when ripe. Open woods, wet low ground, hammocks. September—October.

*Erianthus contortus* Ell. is similar, but has dark brown glumes.

*Erianthus giganteus* (Walt.) Muhl. (*E. saccharoides*) is similar but has straight, untwisted awns which are not flattened in cross section.

\*According to strict definition, these inflorescence branches are not racemes, because they have some sessile spikelets, but this term is usually used.

6b. Spikelets without awns; cultivated plants. Fig. 341.

SUGAR CANE

*Saccharum officinarum* L.

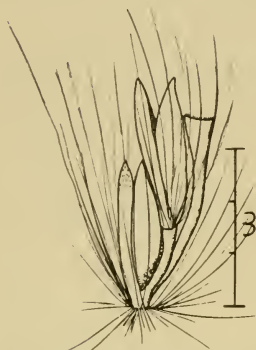


Figure 341

Perennial; tall stout plants, with culms 3—5 m. tall and up to 3 cm. thick. The stiff, elongated leaves have very scabrous cutting edges. Panicles large and plumelike, 20—60 cm. long. The racemes break up into individual joints when ripe, with a pair of spikelets attached to each joint. Sugar cane is widely cultivated in the tropics for the production of sugar, but in the United States is grown only in the southern end of the Mississippi Valley and in Florida. The plants seldom bloom.

*Erianthus ravennae* (L.) Beauv. (RAVENNA GRASS) has a large, plumelike panicle, up to 60 cm. long, and slender culms up to 4 m. tall. Cultivated for ornament and hardy in the southern half of the country.

7a. Pedicels and rachis joints thickened at the upper ends, closely pressed together or united; spikelets awnless.....8

7b. Pedicels and rachis joints not evidently thickened, not pressed together nor united; spikelets awnless or awned.....9

8a. Perfect spikelet spherical, with a rough pitted surface; rachis joint and pedicel united. Fig. 342.

*Hackelochloa granularis* (L.) Kuntze

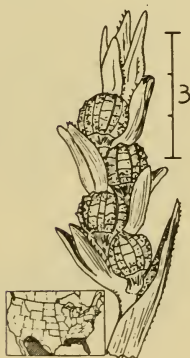


Figure 342

Annual; tufted; culms 30—100 cm. tall, much branched. The culms have numerous axillary racemes; sheaths and culms covered with hairs which arise from little blisters. The spikelets are borne in spikes or racemes, 1—2 cm. long, the individual spikelets being 1—2 mm. long. The racemes break up into individual joints, each bearing a sessile perfect spikelet which is blackish, and a strongly laterally compressed and winged staminate spikelet, which is green or reddish in color. This unusual grass is a native of the Old World tropics, but has been introduced into our southern states. It may yield some forage. Fall.

- 8b. Perfect spikelet lanceolate, smooth or rough; rachis joint and pedicel separate. Fig. 343.

*Manisurus rugosa* (Nutt.) Kuntze



Figure 343

Perennial; culms from hard, knotty crowns; culms flattened, much branched, 70—120 cm. tall, with numerous axillary racemes. Racemes slender, "rat-tail"-like, brownish, 4—8 cm. long, tapering from the middle toward the base and apex. They break up into individual joints readily, each joint bearing a perfect sessile spikelet and a sterile spikelet on a thickened pedicel. The first glume of the spikelet is strongly corrugated across the width. Wet pine woods and bogs, Atlantic and Gulf Coastal Plains. September. Four other similar species are found in the southern states, differing in the degree of roughness, pitting, etc. of the first glume.

- 9a. One raceme on each peduncle.....10  
 9b. Several to many racemes on each peduncle.....12  
 10a. Awns hairy, stiff and strong, 3—12 cm. long; awned spikelets bearing a sharp hairy callus at the base.....11  
 10b. Awns not hairy, thin and delicate, 2 cm. long or shorter; spikelets disarticulating at the base of the glumes.....12b  
 11a. One awned and one awnless spikelet falling as a pair; rachis of the raceme disarticulating. Fig. 344.

**TANGLEHEAD**

*Heteropogon contortus* (L.) Beauv.

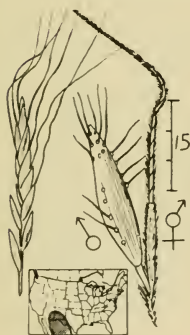


Figure 344

Perennial; tufted; plants 20—80 cm. tall; leaf sheaths flattened and keeled; racemes borne at the tips of slender peduncles. The pairs of spikelets at the base of each raceme are all staminate. In the upper portion of the raceme, each pair consists of a sessile perfect spikelet and a stalked staminate spikelet. The sessile spikelet has a long, bent awn and a hairy rachis joint, which is attached below the base of the glumes. This spikelet greatly resembles the floret of some species of *Stipa*. Attached at the base of the perfect spikelet is a short pedicel bearing an awnless, laterally compressed and winged staminate spikelet. The two spikelets of each pair fall as a unit. Because of the

sharp hairy callus and stiff awn, the perfect spikelets may injure grazing sheep. A good forage grass when not in fruit. Rocky deserts in

the Southwest; found throughout the tropics of both Old and New World. June—September.

*Heteropogon melanocarpus* (Ell.) Benth. has staminate spikelets with glabrous glumes, a row of glandular spots running down the middle of the glume. Southeastern states and Arizona.

11b. Awned spikelets falling, awnless ones remaining on the persistent rachis of the raceme. Fig. 345.

**CRINKLE AWN**

*Trachypogon secundus* (Presl) Scribn.



Figure 345

Perennial; tufted; 60—120 cm. tall; herbage nearly smooth but the nodes bearing a circle of stiff, erect hairs. The erect slender raceme is 10—20 cm. long. The rachis remains whole with the short-pedicellate or sessile staminate spikelets attached to it. The longer-pedicellate perfect spikelets break from the rachis with their hairy, rigid pedicels attached. The perfect spikelet looks very much like the floret of some species of *Stipa*. The lemma is 6—8 mm. long, with a bent and twisted awn 3—6 cm. long. Rocky dry hills. May—October.

12a. Racemes several to many on each peduncle.....13

12b. Racemes one on each peduncle. Fig. 346.

**LITTLE BLUESTEM**

*Andropogon scoparius* Michx.

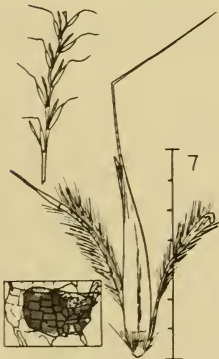


Figure 346

Perennial; tufted; plants green or reddish, 50—150 cm. tall; foliage smooth or hairy. The racemes are borne on slender peduncles from the axils of the sheaths and the tips of the culms. The rachis joints and pedicels are strongly hairy. Little bluestem is characteristically a plant of dry prairies and plains, but occurs to some extent over nearly the entire United States. Prairies, old fields, rocky slopes and open woods. Little bluestem furnishes much grazing in the Middle West and West, especially for cattle and horses. August—October.

Nine other species, similar in having only one raceme on each peduncle, occur in the southern United States, but are much rarer.

13a. Stalked spikelet sterile, reduced to a small rudiment or nearly absent; racemes feathery, white.....14



- 13b. Stalked spikelet staminate, similar to the sessile one but awnless; racemes green or purplish in color, not feathery with fine hairs. Fig. 347.

**BIG BLUESTEM**

*Andropogon gerardi* Vitman

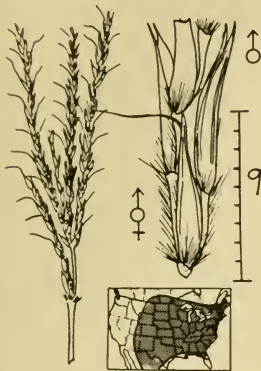


Figure 347

Perennial; tufted or with short rhizomes; plants green or reddish, 1—2 m. tall or even taller; foliage sometimes hairy. The plants bear 3—6 reddish racemes at the tip of the culm, and usually some smaller inflorescences from the axils of the leaves. Big bluestem was one of the principal grasses of the tall grass prairie which produced the rich soils of our corn belt. Very little of such grassland still exists, but this species is still very common on untilled land in the prairie area. Farther east it is less common, but occurs on steep slopes, in meadows, and along river banks. This is an important forage

species, and still provides much wild hay from native prairie. August—October. Also known as *A. furcatus* and *A. provincialis*.

*Andropogon hallii* Hack. (SAND BLUESTEM) has more elongated rhizomes and yellowish spikelets. Sandhills of the Great Plains and Rocky Mountain area.

- 14a. Inflorescence of two to four racemes, which are inclosed at their bases by a leaf sheath. Fig. 348.

**BROOMSEDGE**

*Andropogon virginicus* L.



Figure 348

Perennial; tufted; 50—100 cm. tall; foliage smooth or somewhat hairy, often reddish; culms bearing feathery-hairy inflorescences at the tip and from the axils of the leaves of the upper half of the culm. Broomsedge is a plant of sterile open hill-sides, abandoned fields, and thin woods. It usually indicates poor soil. The forage value is apparently low, especially when the plants are mature. August—October.

About fourteen other similar species or varieties occur in the southeastern states, mostly on the coastal plain. Most striking of these is the following.

*Andropogon glomeratus* (Walt.) B. S. P.  
(*A. virginicus*, var. *abbreviatus* (Hack.)

Fern.). All the inflorescences are condensed into a dense, broom-like



## HOW TO KNOW THE GRASSES

cluster at the top of the stem. Southeastern states; Texas to California, often on damp, low ground.

- 14b. Inflorescence a terminal panicle of numerous racemes; leafy bracts absent from the panicle. Fig. 349.

### SILVER BEARDGRASS

*Andropogon saccharoides* Sw.

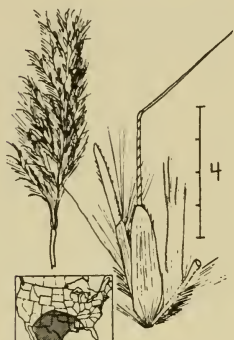


Figure 349

Perennial; tufted; rather bushy; culms 60—130 cm. tall; foliage usually glabrous, becoming reddish when mature. The long-stalked panicles are silvery white, oblong, 7—15 cm. long. The rachis joints and pedicels are fringed with long white hairs. Sessile spikelet of each pair about 4 mm. long, the pedicellate one rudimentary. Silver beardgrass and several of its close relatives are valuable forage grasses in parts of the Southwest, but are easily exterminated by overgrazing. Prairies and plains, rocky slopes, draws and dry washes, often on sandy soil. June—September.

*Andropogon perforatus* Trin. has a small "pinhole" pit in the center of the first glume. Texas and Mexico.

*Andropogon barbinodis* Lag. is taller, with a short, fan-shaped panicle, with spikelets 5—6 mm. long. The nodes of the culms are prominently bearded. Oklahoma to California and Mexico.

- 15a. Stalked spikelets present, staminate. .... 16

- 15b. Stalked spikelets lacking, only the hairy pedicel present. Fig. 350.

### INDIAN GRASS

*Sorghastrum nutans* (L.) Nash



Figure 350

Perennial; in tufts from short rhizomes; plants 1—2.5 m. tall; foliage usually smooth. Panicles narrow and rather dense, 15—30 cm. long. The panicle has a "gold-and-silver" aspect because of the yellow, 5—6 mm. long spikelets and the copious white hairs which fringe the rachises and pedicels. The prominent anthers are golden yellow. The panicle is made up of short racemes of 1—3 joints. Each sessile spikelet is accompanied by a hairy pedicel. The racemes break up into individual joints at maturity, each bearing a spikelet and a rachis joint and pedicel. Indian grass is one of the principal grasses of the tall grass prairie. It is also found in the

eastern states and the Rocky Mountains. It forms an important component of wild prairie hay. Prairies, plains, stream banks, dry hills. July—September.

- 16a. Spikelets when ripe disarticulating from the tip of the pedicel; end of pedicel cup-shaped; rhizomes present; weed. Fig. 351.

**JOHNSON GRASS**

*Sorghum halepense* (L.) Pers.

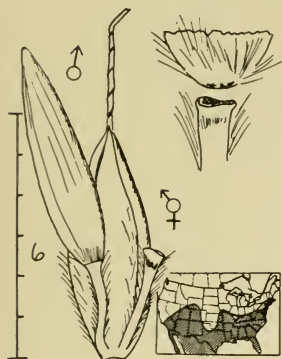


Figure 351

similar to the annual crop, Sudan grass. Despite its bad traits, Johnson grass furnishes a great deal of forage and is readily eaten by livestock. Eurasian.

- 16b. Spikelets when ripe breaking from the plant with the upper end of the pedicel, leaving a jagged stub; rhizomes lacking; crop plant. Fig. 352.

**SUDAN GRASS**

*Sorghum sudanense* (Piper) Stapf

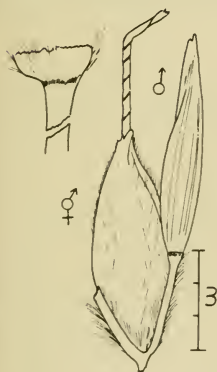


Figure 352

Annual; tufted; culms 1—3 m. tall. The plants resemble those of Johnson grass but lack the rhizomes. Widely cultivated for annual pasture and hay and sometimes found as a stray from dropped seed. Native to North Africa.

*Sorghum vulgare* Pers. (SORGHUM) This species includes a large group of rather corn-like plants, cultivated in warm sections of the country for grain, fodder, silage, and syrup. The leaves and stems greatly resemble Indian corn, but the spikelets, similar to those of Johnson grass, are all borne in panicles at the tips of the stems. The grains may be black, brown, reddish, gray, or white. In many varieties, the grain becomes large enough to burst out of the glumes. Milo, hegari, feterita, durra, kafir corn, shallu, amber cane, broomcorn, etc. are all varieties of this species. Broomcorn is not used for forage, but the stiff, elongated panicle branches are the broomstraw of commerce.

# **TRIBE XIII. TRIPSACEAE**

- 1a. Pistillate spikelets borne in hard, bony beads, each bead on a separate stalk; staminate spikelets protruding on a stalk from the opening of the bead. Fig. 353.

## **JOB'S TEARS**

*Coix lacryma-jobi* L.

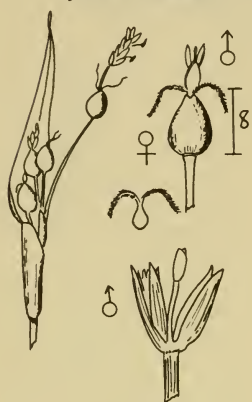


Figure 353

Annual; plants coarse, somewhat corn-like, up to 1 m. tall, abundantly branching from the upper nodes. Each peduncle bears a hard, shiny, white, grayish, or black bead, from the upper end of which protrudes a short inflorescence consisting of few joints bearing sessile and pedicellate staminate or sterile spikelets, in somewhat irregular combinations. Staminate spikelets consist of 2 glumes, inclosing 2 staminate florets. Within the bead is borne a single pistillate spikelet and 2 slender, tubular, sterile spikelets, along with the stalk of the staminate inflorescence. The stigmas protrude from the mouth of the bead. The staminate inflorescence breaks away and the beads fall from the plant

when ripe. Job's tears is cultivated as a curiosity, and for the "beads," which are used in rosaries and jewelry. The plants may be found in the wild in the southern states. Introduced from the tropics of the Old World. Late summer.

- 1b. Pistillate spikelets borne in spikes or on cobs, never separately.. 2

- 2a. Staminate spikelets borne at the tip and pistillate spikelets at the base of the same spike; pistillate portion of the spike hard and bony; husks not present. Fig. 354.

## **GAMA GRASS**

*Tripsacum dactyloides* L.

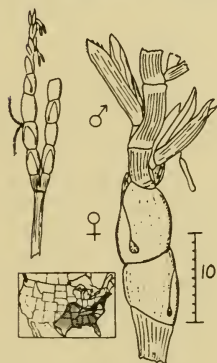


Figure 354

Perennial; in large clumps, from thick rhizomes. The plants reach 2—3 m. in height. The spikes are borne singly or 2—3 together at the tips of long leafless peduncles. The basal portion of each spike consists of a series of hardened, smooth, hollowed-out joints, each nearly inclosing a single pistillate spikelet. These joints break apart readily when ripe. The upper portion of each spike is made up of a series of joints, each bearing 2 sessile staminate spikelets. This portion of the spike is shed whole when the pistillate rachis breaks up. Gama grass is a close relative of corn and has been experimentally crossed with it. The plants are leafy and may produce some forage, but they are sel-

dom abundant. River banks and moist ground. June—October.

2b. Staminate spikelets in a "tassel" at the stem tips; pistillate spikelets on a many-rowed axillary "cob," surrounded by leafy husks.  
Fig. 355.

MAIZE; INDIAN CORN

*Zea mays* L.

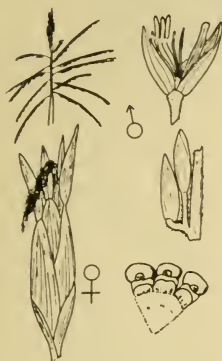


Figure 355

Annual; tufted; plants exceedingly variable in size and habit, but characteristically with thick, solid stalks. The pistillate inflorescence (ear) has paired rows of spikelets. The glumes, sterile and fertile lemmas form the "chaff" that remains on the cob. In a few varieties, such as Country Gentlemen, both florets of each pistillate spikelet develop grains, producing very crowded and ir-

regular rows. Corn is unusual in having united styles, which form the "silk." The staminate inflorescence (tassel), is much-branched and bears pairs of spikelets, one of each pair being sessile and the other pedicellate. Because of the great crowding of the staminate spikelets, the arrangement may be obscured. The staminate spikelets are each two-flowered.

Corn never persists after cultivation and is unknown in the wild state. It is suspected that it originated in Central America.

*Euchlaena mexicana* Schrad. (TEOSINTE) is intermediate between corn and *Tripsacum* in structure. The staminate spikelets are borne in a terminal tassel, like those of corn, and the general appearance of the plants is like that of corn. The pistillate spikelets are borne in single spikes of hardened joints, like those of *Tripsacum*. These spikes break up into 1-spikelet segments when ripe. They are hidden, however, in husks like those of the corn ear. Teosinte is sometimes cultivated as a forage plant in the South and occurs as a weed in the American tropics. It is closely related to corn and hybridizes with it.



Figure 356



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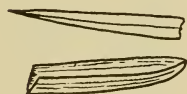


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 Fig. 357



Figure 357

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*AWN*: a protruding midrib of a glume or lemma, forming a beard or bristle. Lateral nerves rarely produce awns, 6. Fig. 358



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Figure 359

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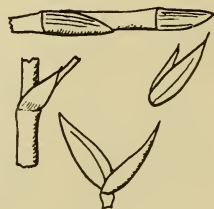


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**DECUMBENT:** said of stems which are somewhat creeping at the base. 3  
     Fig. 362



Figure 362

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     *filiformis* 157  
     *ischaemum* 158  
     *sanguinalis* 158  
**DIOECIOUS:** having the staminate and pistillate flowers on separate plants.  
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**DISARTICULATE:** to break up at some definite point, determined by anatomy. 6 Fig. 363



Figure 363

**Disarticulation** 6  
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FLORET: the unit of the spikelet, consisting of a flower and the lemma and palea which surround it. 5. Fig. 364



Figure 364

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 Giant reed 24  
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 GLUME: an empty bract at the base of a spikelet. 5  
 Fig. 365



Figure 365

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KEEL: a sharp fold, resembling the keel of a boat. 6  
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LEMMA: the outer bract of a floret, which encloses the flower. 5 Fig. 366



Figure 366

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    cognatum 163  
LIGULE: a collar-like projection at the base of a leaf blade, 4 Fig. 367



Figure 367

- Little barley 91  
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LODICULE: a small blister-like body at the base of the flower, which forces the floret open at the time of blooming. 5 Fig. 368



Figure 368

- Lolium 86  
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NERVE: one of the vascular bundles of a leaf or other plant structure, also called a vein. 4, 6  
New Zealand bent 116  
Nimble Will 120  
Nit grass 113  
Nodding fescue 71  
Nodding foxtail 152

NODE: the usually swollen joint of a stem, at which a leaf is attached. 3 Fig. 369



Figure 369

## O

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    miliacea 109  
    racemosa 108  
OVARY: the swollen lower portion of the pistil, which contains the seed. Fig. 370



Figure 370

## P

PALEA: the inner of the two bracts which enclose a grass flower. 5, 6 Fig. 371

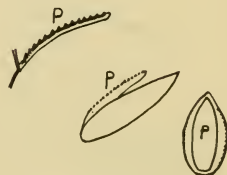


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 PEDICEL: the stalk of a single spikelet. 5  
 Fig. 372



Figure 372

PEDUNCLE: the stalk of an inflorescence. 5  
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   ruppeli 150  
   setaceum 150

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   canariensis 144  
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 Prairie cup grass 155  
 Prairie dropseed 127  
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 PROPHYLLUM: the membranous structure found between the main stem and the base of a branch. 3  
 Fig. 373



Figure 373

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   japonica 15

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   airoides 58  
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## Q

Quackgrass 88  
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 RACEME: an unbranched inflorescence, bearing spikelets on pedicels which are attached to the central axis. 5  
 Fig. 374



Figure 374

RACHILLA: the central stalk of a spikelet, which bears the florets. 5, Fig. 375



Figure 375

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**RACHIS:** the central axis of an inflorescence, which bears branches or spikelets. 5

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Red sprangletop 132  
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**RHIZOME:** a stem which grows beneath the surface of the ground. 3, Fig. 376



Figure 376

Rhode Island bent 116

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**SESSILE:** seated directly on the axis; lacking a pedicel. 6, Fig. 377



Figure 377

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geniculata 151

glauca 151

italica 152

lutescens 151

macrostachya 154

magna 153

verticillata 151

viridis 153

**SHEATH:** the tubular, usually split portion of a grass leaf, which surrounds the stem. 4, Fig. 378



Figure 378

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nitida 100

obtusata 100

**SPIKE:** an unbranched inflorescence, with spikelets attached directly to the axis. The spikelets may be on one side or both sides of the rachis. 5, Fig. 379



Figure 379

Spike fescue 71

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**SPIKELET:** the smallest branchlet of a grass inflorescence, typically consisting of glumes, rachilla, and florets. 5

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**STAMEN:** the pollen-producing organ of a flower. 5

Stems 3

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**STIGMA:** the feathery appendages at the tip of the ovary, which receive pollen. 6, Fig. 380



Figure 380

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    comata 110  
    leucotricha 110  
    robusta 111  
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    viridula 111

**STOLON:** a stem which creeps along the surface of the ground. 3, Fig. 381



Figure 381

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Sugar cane 178  
Sweet vernal grass 145  
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VEIN: one of the vascular bundles of a leaf or other plant structure, also called a nerve. 4, 6  
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